REGULATION Q AND COMMERCIAL BANK LIQUIDITY: 1966 AND 1969

By

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This dissertation is dedicated

to Wally, who taught me that Phuds are real people,

to Mom, who was a real people, and

to Wade, who keeps me a real people.

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REGULATION Q AND COMMERCIAL BANK LIQUIDITY: 1966 AND 1969

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The Banking Act of 1933 ushered in a number of regulations designed to strengthen the commercial banking system in this country and to protect the individual depositors of these institutions. Among these regulations we find Regulation Q of the Board of Governors of the Federal Reserve System. This directive allows the Fed to set maximum interest rate ceilings on member bank time and savings deposits on the basis of deposit type, maturity, withdrawal conditions, and geographic location. Recently authority to differentiate bank time liabilities on the basis of size has been added to this regulation.

Over time, the purpose and usage of this authority has changed, not formally but in its practical administration. During the latter half of the 1960's, the Board of Governors saw fit to utilize this authority (among others) as an anti-inflationary tool of monetary policy, restricting the maximum rate levels on member bank time and savings deposits to low levels relative to interest rates paid on competing instruments.

The restrictive setting of Regulation Q ceilings could theoretically have some serious effects on the commercial banking system, especially with regard to liquidity pressures brought on by Regulation Q-induced time deposit losses. Restrictive Q ceilings at commercial banks might even force bank managers to dump unlikely parts of their asset portfolios if the deposit losses could not be covered by routine sources of liquidity available to meet such losses--borrowing at the Fed, in the Federal funds market, or in the Eurodollar market, or from sales of securities from the secondary reserves of these institutions.

Specifically our research tested the following hypotheses:

I: Commercial bank time deposit liabilities are interest sensitive.

II: Losses of bank time deposits will be reflected in significant declines in commercial bank liquidity ratios.

III: Commercial banks are forced to sell municipal securities from their asset portfolios in a liquidity crisis.

Our research, covering the period mid-1961 through mid-1970, using a sample of all insured commercial banks, concluded first that bank time and savings deposits appeared to be related significantly only to savings and loan association rates and that commercial bank time deposit holdings were significantly lower than expected on four dates during our survey period, only two of which correspond to times when we maintain that Q ceilings were restrictively set. We concluded further that at no time during the 1961-70 period could we find significant correlation of commercial bank liquidity crises and restrictive Q ceilings. Finally, we found two periods when actual commercial bank municipal holdings were significantly below what would have been expected on the basis of the growth of bank assets, the yields on municipal securities, and the alternative rates of return (in the form of yields on U.S. Treasury bonds). Only one of these two latter months coincided with periods of restrictive Regulation Q ceilings.

Our study seems to suggest that while we can pinpoint periods when Regulation Q apparently kept commercial banks from competing for lendable funds during the years 1961-1970, this inability to compete did not have significant effects on the liquidity position of banks in general, nor did it force them into drastic portfolio readjustments of a magnitude that might be termed destabilizing.

CHAPTER I

INTRODUCTION

Prompted by a general desire to improve man's understanding of his environment, economists have sought to describe how man's individual and aggregate economic desires are intricately tied to his actions involving money. This catalog of explanations has been expanded, arranged, and generalized upon such that we now have what we know as monetary theory. This theory is not stagnant however. As economic conditions have changed over time, so too have the theoretical explanations of how and why such conditions exist.

Man does not stop here. He is not satisfied with a better explanation or a better description of phenomena. Man pushes on and enters the realm of control He takes his theories and devises ways in which he can alter the outcome of particular sets of phenomena which he has observed and described. The man we know as the economist is behaviorally no different. Monetary theory is thus promptly followed by monetary policy.

Recently, renewed interest has arisen in the field of monetary economics, caused in part by a growing dissatisfaction with the performance of the economy over the business cycle, by more compelling international demands, and by structural changes in our system of financial intermediation (1). We can identify the trends closely linked to this increased interest: (a) a sophistication and growth of monetary theory itself, (b) a shift in policy toward the desirability of changing existing economic conditions; and (c) the proliferation of tools designed to implement such policies. It will not be our purpose here to discuss these three evolutions, an interesting and rewarding task to be sure. Rather we will examine in considerable detail one of the instruments made available to the monetary authorities for policy purposes Regulation Q of the Board of Governors of the Federal Reserve System.*

Regulation Q

Definition of Q

Regulation Q is that directive issued by the Board of Governors under its authority to control maximum interest rates on member bank deposits. As part of a package of economic controls, Congress passed the authority for this regulation in the Banking Act of 1933. The legislation, signed into law by President Franklin D. Roosevelt on June 16, 1933, reads as follows:

---

*Hereafter referred to as the Board.

> The Federal Reserve Board shall from time to time limit by regulation the rate of interest which may be paid by member banks on time deposits, and may prescribe different rates for such payment on time and savings deposits having different maturities or subject to different conditions respecting withdrawal or repayment or subject to different conditions by reason of different locations(2).

As directed by this law, the Board formulated Regulation Q, Maximum Interest Rates Payable on Time and Savings Deposits, setting the initial maximum rate for all categories of time deposits (3) at three percent. The 1933 Banking Act also abolished the payment of interest on demand deposits at commercial banks. The Banking Act of 1935 provided for a similar regulation to be applied to insured nonmember banks by the Federal Deposit Insurance Corporation, and since that time Regulation IV of the FDIC has been set at levels identical to those of Regulation Q. Essentially then, no insured commercial bank in the United States may pay interest on a demand deposit or pay interest above certain ceiling rates on a time deposit.

Changes in Q

Throughout the years, Regulation Q interest ceilings have been raised when the monetary authorities deemed it necessary for the continued growth of the banking industry, AND when they found no evidence of "excessive interest rate competition" (4). In the face of generally rising interest rates, increases in the rate paid on commercial bank time deposits will normally insure continued participation of the commercial banking system in economic growth as bank liabilities and bank credit expand to meet the demand for them. Interest rate increases are usually competitive and healthy responses to an increasing demand for funds, but under the law such increases can only be accomplished with the permissive administration of Regulation Q ceilings.

It may not always be the case that rising interest rates at financial intermediaries denote a healthy interplay of demand and supply factors however. Some economists contend that rising rates on time deposits are accompanied by deterioration in the quality of the asset portfolio and by a non-productive (i.e., no longer contributing to the allocative function of the price mechanism) spiraling of interest rates at participating institutions. This condition they call "excessive interest rate competition." It is then suggested that ceilings on time deposit interest rates can eliminate the possibility of this condition which occurs as banks allegedly raise interest rates paid on their deposit liabilities, find themselves squeezed by the increased costs inherent therein, and reach for compensating increases in asset yields chiefly through acquiring lower-quality or longer-maturity investments and loans. Interest rate ceilings on time deposits at commercial banks thus supposedly protect the safety, solvency, and liquidity of the banking system and preserve the payments mechanism.

Clearly, if commercial banks are to compete effectively for funds by raising or lowering the yield on various types of time liabilities, when to raise and when not to raise (or even to lower) interest rate ceilings on bank time deposits becomes an important if difficult decision for monetary authorities to make. The Board of Governors of the Federal Reserve System has made this decision a number of times throughout the 37 year history of Regulation Q. We will be looking at conditions existing in the economy and in the banking system at the time these changes were made, the reasons given for the changes, and most importantly, the effects which the changes in Regulation Q ceilings apparently had on bank deposit and bank credit growth.

The Scope of the Study

Primary Focus

We would like to be able to thoroughly study and analyze all of the effects that Regulation Q has had on the financial community, on each segment of that community, and on the real goods sector and each segment of that sector from 1933-1970. Unfortunately that task is of a magnitude impossible to perform here. We must restrict our work to a considerably smaller area.

We will be examining Regulation Q in its most recent usage as a restrictive (5) monetary control and assessing what this usage has meant for commercial bank deposit liquidity positions, and for the composition of commercial bank asset portfolios. The areas to be touched by our research are: the substitutability of financial claims; the determinants of time deposits; the size and composition of bank asset portfolios, changes in the asset portfolio; and liquidity standards of commercial banks.

In this study, we will be looking at commercial bank reaction to changes in deposit flows. Specifically, we will be interested in measuring the effects the failure to raise Regulation Q ceilings in 1966 and in 1969 had on commercial bank time deposit growth, and what impact these affects had on bank liquidity positions. We will examine bank portfolio managers' reactions to any disturbances in planned liquidity ratios for those dates Finally, we will examine commercial bank holdings of municipal securities during this period in an effort to determine whether banks sold municipals and whether such sales can be linked to the administration of interest rate ceilings on time deposits. We would expect to find considerable linkages between the restrictive use of Regulation Q and serious deviations in bank liquidity ratios if commercial banks have no way of adjusting to a liquidity crisis other than through the sale of these assets.

Subsidiary Topics

What will we not be studying? The questions we seek to answer in our paper are quite closely related to a second group of topics: the payment of interest on demand deposits, multiplicity of banking regulatory agencies, profitability of commercial banking, instability in the residential mortgage market; the effectiveness of monetary policy, the growth of bank non-deposit debt liabilities; the stability and control of the money supply; and so on. Unfortunately we cannot deal with this latter group of questions here. Each one of these questions, tangentially related to our central topic, has been the subject of a number of rigorous studies at least as comprehensive as ours. Time and space require that we limit our discussion of these areas to their bearing on Regulation Q and liquidity crises--our primary concerns.

The Plan of the Study

This paper represents an attempt to determine more exactly what effects a "sticky" Regulation Q has on the banking system and how bankers collectively react to this restrictive ceiling. We need to examine the historical changes made in Regulation Q (both with regard to purpose and to level) in order to better appreciate what is currently happening to this instrument. We also need to discuss, in more detail, the many problems surrounding Regulation Q and our current concern in this study. Chapter II is our historical review, Chapter III contains recent criticisms of this monetary instrument.

Next we examine the literature and evidence collected on our various theses. Chapter IV reviews the weight of expert opinion on such matters as whether commercial bank time deposits are substitutes for other claims in financial portfolios, whether commercial banks have identifiable liquidity ratios and how commercial bankers act to maintain equilibrium in such ratios. This chapter also contains a discussion of whether banks will sell assets or borrow to meet unexpected deposit withdrawals and whether commercial banks will sell State and local municipal securities from their asset portfolios under stress. Chapter V will set out our hypotheses and present the methodology for testing them

The empirical testing of our theories is the topic of Chapter VI. We will try to answer such questions as: Did Regulation Q, when used as a tool of restrictive monetary policy, cause serious departures from expected time deposit growth? Did time deposit losses cause serious aberrations from planned bank liquidity ratios? Did commercial banks actually dump municipals onto the market as their way of adjusting to an altered liquidity position? It is in this chapter where we determine (or at least pinpoint more closely why we could not determine) the validity of certain statements which recently have been widely accepted or assumed by many economists.

The findings of our research are summarized in Chapter VII, along with our conclusions about Regulation Q and commercial bank behavior in recent boom periods

NOTES

1. Maurice Mann, "How Does Monetary Policy Affect the Economy?" *Federal Reserve Bulletin*, October, 1968), pp. 803-4.

2. U.S. Laws, Statutes, Public Law Number 66, 73rd Congress, Section 11 (Washington: U.S. Government Printing Office, 1933).

3. "Time Deposits" in this paper will mean any deposit not legally withdrawable on demand and on which commercial banks pay explicit interest. The term includes both "Savings Deposits" (time liabilities of commercial banks with no specific maturity date held primarily by individuals, but also available to non-profit organizations) and "Other Time Deposits" (those time liabilities of commercial banks which may be held by anyone but which have specific maturity dates). Savings deposits include passbook savings accounts, golden passbook savings accounts, and the like. Other time deposits include certificates of deposit, savings certificates, time deposits open account, etc.

4. See Tables II-3 and II-5 for changes in Regulation Q ceiling rates. We can only observe here that the Board would not have raised ceilings from 1957 to 1965 if evidences of excessive interest rate competition among banks existed and could be identified by the Board.

5. There has been some discussion in the literature as to whether the freezing of Regulation Q ceilings was, in fact, primarily expansionary, or contractionary with regard to money either narrowly or broadly defined. Whether such freezing is "restrictive" in the sense of being a tool of tight monetary policy remains to be ascertained. The point remains, however, that the Board apparently intended such a freeze to restrict commercial banks' ability to expand credit. In this sense, Q is restrictive, and it is in this sense we shall call it such.

CHAPTER II

REGULATION Q--PAST AND PRESENT

The Federal Reserve System's authority to set ceiling rates on bank time deposits is one of the more unusual tools the agency possesses. Regulation Q has been legally in force for almost four decades, was not actively utilized until 1957, and has had its use and purpose totally changed during its history.

While this regulation was originally intended as a safeguard against excesses of overly-eager bankers, we have seen it being used differently in the last decade and have heard a number of criticisms of its new usage. One author, in discussing the changing use and consequent reappraisal of Regulation Q, notes that

> most changes were undertaken to support the general goals of monetary policy in force at any time. To be sure, there was some awareness of the impact of Regulation Q on financial structure, that is, on the evolution of financial institutions. Up to 1965, however, the purposes of short-term financial policy and the effects of Regulation Q changes...were not inconsistent. Questions about the desirability--or even the purposes and functions--of Regulation Q were not raised by many (1).

The implication is that since 1965 Regulation Q has been used in ways which call forth such questions. Thus, while the appearances of not raising Q ceilings are the same, the intent of not raising Regulation Q in the face of generally rising interest rates is considerably different (a) when stopping excessive interest rate competition, and (b) when restricting bank lending to certain sectors of the economy (business) and/or funneling it into others (housing). We have evidence that the administration of Regulation Q has shifted more and more from the former defensive to the latter offensive type of usage. In the following pages, we will review the changes made in this tool and its uses and the conditions surrounding these changes.

This is perhaps an appropriate place to mention the sorts of things we will be assuming about the economy and about financial behavior throughout our study. We will take for granted that as the economy moves from trough to peak and as the boom builds, the demand for loanable funds tends to outstrip the supply of loanable funds because either (a) savings tend to grow more slowly than investment demand or (b) Federal Reserve policy restricts the growth of the money supply particularly as the expansion continues. We will assume the opposite types of spending and policy reactions during recessions. If our assumptions are true, during expansions the level of interest rates in the economy tends to increase and during recessions the level of rates tends to decline.

We believe that these generalizations describe financial behavior--at least in a price-allocating market economy. While the assumptions we have made may not hold in all markets at all times, we feel safe enough with them to use them as approximations of economic behavior (2).

We implied earlier that commercial banks are capable of attracting or discouraging inflows of deposits, particularly time deposits. This necessarily means that bank liabilities are, in some measure, competitive with and substitutable for some other types of financial claims or perhaps even with real expenditures. We are not prepared to defend the substitutability assumption at this point, preferring to delay the evidence until we have more clearly explained our interest in the growth of bank time deposits. Our discussion of Regulation Q will clearly make this assumption however.

Inclusion in the Banking Act of 1933: the Support for Interest Rate Ceilings

The authority for Regulation Q was passed as part of the reforms following the Great Depression and the failure of the commercial banking system during the late 1920's and early 1930's. As the various provisions of the 1933 Banking Act were being hammered out, a portion of Congress viewed "excessive interest rate competition" among commercial banks as one of the main contributors to the bank failure epidemic of 1929-1933 (3, 4, 5) when time deposits of banks fell by $8.2 billion, a drastic 41 percent decline (6).

By excessive interest rate competition is meant the process whereby a commercial bank, in its effort to attract new deposits, offers a higher and higher rate of interest on its time liabilities, and finds that interest cost per dollar of deposits has risen. Then, the commercial bank portfolio manager, charged with the job of making a profit for bank owners and with satisfying customer loan demands, is supposedly forced into buying higher-yielding assets to cover his higher-cost liabilities, thus "reaching for yield." The bank is forced into buying longer-maturity, higher risk assets in order to increase the average asset yield sufficiently to maintain previous profit margins.

A bank may then find itself in a rather precarious position: if deposit liabilities are withdrawn, the bank might be unable to meet these withdrawals without liquidating some of its assets. It may be forced to take sizable losses on the book value of its "questionable" assets or might not be able to sell them at all. The result is insolvency for the bank.

This sort of process would of course be unfortunate for the individual bank, but as a single incidence among the thousands of commercial banks it would not be devastating to the entire system. If a number of banks in the economy faced this threat simultaneously, however, and as withdrawals are made from the system as a whole, then complete chaos in the banking system is almost inevitable.

One way to eliminate this possibility, it was thought, was to limit, by regulation, the maximum interest rate that banks can pay on their time deposits and to prohibit the payment of interest on demand deposits. This is the course which Congress took.

Advocates of interest rate ceilings asserted two things about commercial banking in this country. First, that commercial banks are not just another private industry; their well-functioning has important implications for the public interest over and above their importance to bank owners and hence, commercial banks must be regulated to "maintain certain minimal operating and fiduciary standards..." (7). Second, that commercial banks did in fact engage in excessive interest rate competition in the 1920's, that such competition was a major cause of bank failure, and that the prevention of such competition via interest rate regulation would preclude such things as the 50 percent decline in the number of commercial banks that occurred between 1920 and 1934 (8). Lawrence S. Ritter, a careful student of Regulation Q, summarized the events of those years:

> The regulation of deposit interest rates contained in the Banking Acts of 1933 and 1935 was, of course, a reaction to the disintegration of the banking system, and the economy as a whole, in the early 1930's. Of all the aspects of the Great Depression, the one that probably caused the most consternation in informed financial circles, as well as among the lay public, was the almost total collapse of the banking system. The Federal Reserve System had been established in 1913 to prevent just such financial crises, and in the 1920's its success in achieving its purposes was widely if not universally acknowledged. Thus, when the last semblance of stability finally gave way in 1933, with over 4,000 bank failures in that year alone, it was to be expected that a considerable portion of the legislative attempts at economic recovery would be concerned with the financial system in general, with the banking system and the Federal Reserve in particular. That part of the depression-induced legislation which dealt with the regulation of interest rates on deposits was predicated on the grounds that excessive interest rate competition for deposits had weakened the internal soundness of the banking system, and thereby made it vulnerable to any shock imposed from without. Indeed, it was felt, in retrospect, that many of the bank failures of the 1920's, even before the depression, had probably stemmed fundamentally from excessive interest rate competition for deposits. It was concluded therefore, that removal of this source of instability at its very roots could only have beneficial results (9).

Acceptance of the need for Regulation Q was not and is not universal, however. The first assertion regarding the importance of the commercial banking system as holder and transmitter of the nation's money supply most economists accept. Indeed, the whole fabric of supervision and regulation of the Federal Reserve System, the Federal Deposit Insurance Corporation, and the fifty state banking commissions is woven around this premise. While conditions without commercial banks or with considerably less-regulated ones might not be as disastrous as some would have us believe, banking history of this country relates vivid tales of financial chaos at worst and economic inefficiency at best whenever we experienced a large-scale collapse of the commercial banking system. That banks and banking stability are terribly important to the well being of the economic system is still a central assumption of most students of banking today.

The assertion that banks were participating in excessive rate competition during this period is open to more question. Some economists (10, 11) suggest that there is little if any evidence pointing to excessive competition for deposits as the culprit in the banking debacle of the 1930's. We can only assume that this fact was not known or was smothered in the private chambers of Congress in 1933 since the authority for Regulation Q was embodied in the legislation (12). We believe that the authority to regulate interest rates on bank deposits rode its way into the statutes of the United States on a wave of panic and humiliation that the U.S. had ever allowed the Great Depression to occur, and on the determination that anything which had been linked in any way to this chaos was never to happen again (13, 14).

Early History of Regulation Q: 1933-1956

1933 1945

Between 1933 and 1956, the Federal Reserve made relatively little use of Regulation Q. On only two occasions were the maximum interest rates changed, in 1935 and 1936, and both changes were in a downward direction. The absence of changes in this regulation from 1936 to 1957 can be attributed to economic conditions and bank positions during those years.

Although this is a relatively long and varied segment of our economic history, we can generally characterize it as one of adequate supplies of funds (15), relatively low interest rates (16), and conservative banking attitudes (17). Under such conditions, there was little need to change Regulation Q ceilings because commercial banks were not actively competing for time deposits (18). We are not saying here that commercial banks' time deposits did not grow during these two decades, but merely that the initiative for the growth came largely from the depositor and not from the bank as the latter passively accepted an increasing volume of time deposits.

Commercial bankers believed that increases in time deposits would probably come at the expense of demand deposits, that lost time deposits would return to the banking system anyway as the funds were used for the purchase of real goods and services or for money market instruments, and further that holdings of time deposits would increase in recessions when the banks did not really need them and decrease in expansions when they were needed the most (19). Believing such things, few bankers could be expected to promote time deposits through strong advertising campaigns or through increases in the interest rate they were willing to pay on time deposits.

During the 1930's, inflows of gold from other countries provided more than sufficient funds to a predominately wary spending sector, such that banks had no need to consciously attract additional funds (20). It is also likely that commercial banks would have been somewhat hesitant about soliciting funds (even if they had needed them) via an increase in interest rates on time deposits in light of the Congressional publicity they had just endured.

World War II followed closely on the heels of the recovery from the Depression, and with the War came greatly increased public and rather restricted private expenditures The 1941-1945 period was consistent with typical war finance patterns (21). With slack demand for private bank loans because of governmentally restricted private investment, and with a rapidly growing war fed money supply, banks surely could not be expected to actively solicit time deposits.

Furthermore, during this period, the U.S. Treasury and the Federal Reserve System had agreed to finance the War at the existing level and pattern of interest rates through the Fed's support of U.S Government security prices. During this time of national emergency, the Federal Government needed to know that it had a ready buyer for all issues of securities and that the interest cost of the debt would not be permitted to rise. Representative interest rates for the period 1936-1945 are presented in Table II-1 and show how far the level of interest rates had sunk during the period, a level hardly conducive to aggressive bank solicitation of loanable funds.

Table II-1: TREASURY BILL AND BOND YIELDS, 1936-1945, ANNUAL AVERAGES (in percent)

DATE	BILL	BOND
1936	.17	2.65
1937	.28	2.68
1938	.07	2.56
1939	.05	2.36
1940	.04	2.21
1941	.10	1.95
1942	.33[a]	2.02
1943	.37	1.98
1944	.37	1.92[b]
1945	.37	1.60

[a] Slight discontinuity in Bill series.
[b] Slight discontinuity in Bond series.
Source. Federal Reserve Bulletin, selected issues, 1936-1946.

1945-1956

The period from 1945 to 1951 was an interesting one for the commercial banking industry. The bond support program was still in effect as the Treasury fought the battle of continuous refunding. Consumer price controls which had worked rather effectively during the War were gone. All sectors of the economy had been denied the opportunity to purchase many needed goods and services during the War and had instead saved large portions of their rapidly increasing incomes. After the War spending mushroomed and loan demand at commercial banks expanded. Commercial banks, needing funds, sold some of their huge holdings of U.S. Government securities which they had accumulated during the War years. These security sales entailed no capital losses because of the continuance of the Federal Reserve's support program (22). That banks preferred the sale of securities to the attraction of new time deposits is explained succinctly by Peter A Frost:

> The commercial banks emerged from World War II in a very liquid position as exemplified by the low ratio of loans to earning assets. This situation reflected a relatively low demand for bank loans, probably due to the public's large holdings of liquid assets. The banks could not quickly adjust their ratio of loans to earning assets without accepting high-risk loans and, thereby, moving to a less desirable risk-return combination. Since a bank must pay the same rate to all of its passbook depositors, the marginal cost of obtaining new savings deposits by increasing the interest rate paid on these accounts is greater than the new interest rate. The combination of the relatively high marginal cost of obtaining new savings deposits by raising the rate paid on these deposits and the relatively low demand for loans gave the majority of the commercial banks little incentive to aggressively bid for deposits. For most banks the marginal cost of new deposits was probably greater than the yield on government securities (23).

After 1951, conditions in our monetary system changed considerably. In that year, the Treasury and the Federal Reserve System agreed to drop the price support policy in favor of a more flexible monetary policy, but this meant a more flexible interest rate structure too. Private spending increased almost continuously after World War II. Consumers and businesses first sought to replenish worn and outdated goods whose production had been limited or prohibited during the War and later rushed to beat similar spending controls anticipated in connection with the Korean Conflict. The Federal Government, of course, greatly increased public expenditures as it financed this "Police Action." Loan demand at commercial banks rose quite strongly (24).

The Federal Reserve System was not idle during this period. It increased the supply of reserves to banks sparingly in an effort to keep prices from climbing. This policy stance caused the money supply to grow less rapidly than GNP, and interest rates to rise. Commercial banks, faced with rising loan demands, slower than desired growth in bank reserves, and a large government securities portfolio, continued to liquidate substantial amounts of these latter assets. But there was one difference: they now did so at declining prices. Spending pressures intensified the demand for funds in the boom years of 1955 and 1956. Loan-to-deposit ratios of banks edged upward to post-

Depression highs, and liquid asset-to-total asset ratios declined rapidly as banks sold U.S. Governments (25). It was becoming obvious that commercial banks were going to have to find new sources of funds to meet their customers' demands for loans.

During this period Regulation Q rates were not raised because there really was no need to raise them. Commercial banks were not competing for time deposits initially because loan demands were slack and later because they had other, probably less expensive, sources from which they could obtain funds as needed. When banks do not compete for deposits, the interest rate paid on them will not be raised so as to approach the rate ceilings set by the monetary authorities. Few banks complained of their deposit rates "bumping" against Regulation Q rates until about 1956 (26).

The average interest rate paid on time deposits by member banks is compared with the U.S. Treasury Bill yield for the period 1936-1956 in Table II-2. We note that ex cept in the last year, 1956, the short-term Government rate never got more than 60 basis points above the average time deposit rate. It appears that until this last year, commercial bankers desiring to raise the interest rate paid on time deposits could have done so and have been reasonably sure that their liabilities would have been attractive to potential savers. The fact that they did not raise time deposit rates must be interpreted as a sign that they saw no necessity to use this method of raising funds.

TABLE II-2: U.S. TREASURY BILL YIELDS AND INTEREST RATES PAID ON TIME DEPOSITS, MEMBER BANKS, 1936 1956 (in percent)

DATE	TB	TD	DATE	TB	TD
1936	.17	1.64	1947	.63	.84
1937	.28	1.56	1948	1.04	.87
1938	.07	1.48	1949	1.10	.89
1939	.05	1.36	1950	1.22	.91
1940	.04	1.22	1951	1.55	1.02
1941	.10	1.12	1952	1.72	1.13
1942	.33	1.03	1953	1.89	1.23
1943	.37	.87	1954	.94	1.30
1944	.37	.84	1955	1.72	1.36
1945	.37	.85	1956	2.62	1.58
1946	.37	.82			

Source: Federal Reserve Bulletin, selected issues, 1937-57.

A comparison of the average interest rates paid on bank time deposits with the Regulation Q ceiling of 2.5 percent for all time liabilities except 3-6 month time deposits (on which the ceiling was 2.0 percent) and 1-3 month time deposits (on which the ceiling was 1.0 percent) for 1936-1957 also indicated little need to raise Regulation Q ceilings except perhaps in the very shortest of maturities.

The Intermediate Years: 1956-1965

The Prelude to Competition

The stage was already set for the raising of Regulation Q on January 1, 1957, after 21 years of inactivity. Loan demands at commercial banks had grown steadily stronger during the expansion of 1955-56: the prime loan rate was raised four times during these years, first to 3.25 percent then to 3.50 percent, then to 3.75 percent, and finally, to 4.00 percent (27). Funds to meet this loan demand were increasingly difficult to obtain out of sales of U.S. Governments as falling prices on these securities meant continuing capital losses to sellers (28) and as banks pared their liquidity cushions further than they had in years. It

> gradually became clear that excess liquidity was far from being an inexhaustible source (of funds and that) 'loaned up' was not a theoretical concept, but a point which the banking system could, in fact, reach and more importantly towards which it was heading (29).

The good old days were gone. The days of huge inflows of funds at little or no cost, of low interest rates on time deposits, and of bulging Government securities portfolios (whose capital values were supported by the Federal Reserve) were now history (30). In spite of its aversion to competing for time deposits (31), the commercial banking system realized that this was the next most logical source of funds (32).

The opening up of time deposit competition was inevitable. Throughout the post-World War II period commercial banks had slowly lost competitive ground to the savings and loan associations, the mutual savings banks, and the credit unions (33). The growth in bank assets had not even kept up with the growth in national income as commercial banks alternatively faced excess liquidity from the War (34); discrimination in tax laws and regulatory restrictions (35); internal pressures not to aggressively compete (36); highly aggressive competition from other financial intermediaries (37); a relatively slow growth in demand deposits as the Federal

Reserve System regained its restrictive monetary tools in 1951 and put them to work in 1955 and 1956 (38), and a growing trend among both corporations and individuals to pare cash reserves and invest idle funds in attractive short-term market outlets such as U.S. Treasury Bills, commercial paper, and bankers acceptances (39). While not all of these forces were continuously operative in the post-War period, they were collectively sufficient to keep commercial banks from fully sharing in the financing of a growing economy. They were sufficient, that is, until 1956.

Change in Regulation Q: 1957

After the recession of 1954, some bankers began to suggest that one of the reasons they were not participating fully in economic growth was because the level of Regulation Q did not allow much freedom to join in the competitive race for time deposits. It was noted that

> for the first time since the passage of the Banking Act of 1933 interest rates had risen across the board to the point where many bankers were paying the maximum rates permitted under Regulation Q, which were the same rates that had been put into effect on January 1, 1936. And these rates were, in 1955 and 1956, proving inadequate to permit those commercial banks who desired to compete effectively with other financial institutions for the now highly prized time and savings deposits. It was on such grounds as these that after 21 years Regulation Q was changed, effective January 1, 1957, to permit new and higher maximum rates (40).

On that date, the Board raised Regulation Q rates to the levels shown in Table II-3. In announcing this change, TABLE II 3: REGULATION Q CEILING RATES ON MEMBER BANK TIME AND SAVINGS DEPOSITS, BY CATEGORY OF DEPOSIT, 1933 1957 (in percent)

TYPE DEPOSIT	11/1/33	2/1/35	1/1/36	1/1/57
SD, all	3.00	2.50	2.50	3.00
TD, 1-3 mo	3.00	2.50	1.00	1.00
TD, 3-6 mo	3.00	2.50	2.00	2.50
TD, over 6	3.00	2.50	2.50	3.00

Source: *Federal Reserve Bulletin*.

which affected all but the very shortest of time deposits, the Federal Reserve Board of Governors conceded that

> in a period of heavy demands for funds and a relatively high structure of interest rates generally, it would be desirable to permit individual member banks greater flexibility to encourage the accumulation of savings than was available under the existing maximum permissible rates. It also appeared to the Board that there was insufficient reason to prevent banks, in the exercise of management discretion, from competing actively for time and savings balances by offering rates more nearly in line with other market rates (41).

In response to this new rate leeway, many banks did increase their time and savings deposit rates. Bank time deposits increased sharply, growing by $5.5 billion from the end of 1956 to the end of 1957 (42). The race for savings was on.

It is clear, in retrospect, that the whole attitude of commercial bankers toward competition changed after 1955. Bankers seemed to have finally escaped from the pall that the Great Depression and the War had cast over banking competition, innovation, and consequently, growth. This general increase in commercial banking competitiveness, mentioned by many economists (43), was put to work in a number of specific areas. Banks began to compete for funds in the open market and with other financial intermediaries on the basis of the interest rate they offered on time deposits (44). They increased advertising efforts to make the public more aware of their numerous products and services (45, 46). They actively solicited new loans and sought out new investment outlets (47). And finally, they introduced new types of bank liabilities designed to attract previously lost funds or to tap new sources of funds (48).

New Deposits

Banks quickly learned the advantages to be gained by creating new types of deposits. Assuming that buyers of financial assets have a variety of instruments from which to choose and that they select the one(s) which gives them the most desirable combination of convenience, safety, liquidity, and yield (constrained, of course, by some income factor); and knowing that trade-offs are made among these features to some extent, commercial bankers will benefit most by differentiating as far as possible among the various time liabilities they offer. In doing so, they will be substituting non-price factors for higher yields and will hopefully minimize out-of-pocket costs. Bankers will then be aiming to capture "the widest feasible spectrum of depositors"(49). In a more technical vein, such a differentiation allows for a lower marginal cost on new deposits since it allows the market to be segmented much more finitely, with the result that increases in the rate paid on a particular time deposit will then apply to only one segment of a bank's total deposits, not to all of them--both old and new(50).

Ideally, commercial banks would like to be able to negotiate the interest rate on a time liability with each individual saver, thus carrying the principal of price discrimination outlined here to its logical conclusion. While this is naturally not possible or at least not very feasible, such differentiation and increased competition as did occur apparently paid off well for commercial banks. Time and savings deposits increased 171 percent from 1946 to 1961, while demand deposits grew at a rate of only 26 percent over the same period, and GNP expanded by a healthy 144 percent(51).

The most notable of the new types of deposits at commercial banks was the negotiable time certificate of deposit. This instrument in its non-negotiable form had been part of the commercial bank portfolio for a long time, but its introduction in 1961 by a major New York City bank in a form which was negotiable between parties was novel. The negotiable certificate of deposit is very similar to other money market instruments in that it is "evidenced by a document that specifies a principal amount, a maturity, and the rate at which interest will be paid" (52) on the security, and can be freely bought and sold. Requisite to the negotiability of a financial instrument is a trading market, and one was created for the CD when a large government securities dealer announced that he would "make a market" in large-denomination negotiable CD's of prime commercial banks (53).

Individual banks introduced the certificate of deposit in 1961 specifically to counteract the decline in the growth of demand deposits that they had been experiencing as large corporations improved their cash management practices (54). Many banks also added either or both of two other types of time deposits, a smaller-denomination negotiable certificate of deposit attractive to smaller businesses and individuals, and a new type of "savings certificate" aimed directly at banks' intermediary competitors (55). These new instruments were immediately successful for the banking industry (56). Large denomination CD's, for example, grew to over $17 billion by late 1965 (57). The expansion in types of deposits offered by commercial banks was designed to increase individual banks loan potential. Depositors were encouraged to switch from holding idle demand deposits to buying one of these new type of time deposits. Since there is a differential reserve requirement on demand versus time liabilities at commercial banks, such a switching would release reserves which could then be used to support a growth in bank assets and liabilities.

We can, then, mark 1961 as a very important year for the banking industry. The introduction of a liability which offered safety, liquidity, negotiability, marketability, and an attractive yield changed the whole competitive atmosphere surrounding banks (58). These moves

> broadened the area of bank competition for funds and signalled the beginning of intensive efforts by banks to attract more interest-sensitive deposits. Many banks were forced to break away from past norms not only to meet nonbank competition but also to react in kind to the efforts of other banks to buy funds (59).

With this shift in mood behind them, commercial banks soon came to see the attraction of using such instruments in an offensive as well as in a defensive way. By offering time deposits with attractive features, individual banks hoped to be able to lure new savings to their doors before they fell into the open market or into other financial institutions. The introduction of the new CD in 1961 marked the beginning of "liability management" (60), the technique of affecting bank growth primarily by affecting the pace and composition of deposit liabilities. This was indeed a new approach. It broke with the traditional assumption that deposits are relatively fixed and that bankers' sphere of discretion lay mainly in the asset portfolio. After 1961, all of this was changed.

Time Deposit Growth: 1962-1965

The remainder of the intermediate period, 1962 through 1965, was an extension of the events which had transpired from 1956 to 1961. After the recession of 1960-61, the Federal Reserve System followed a policy of relative ease. There was little upward price pressure and this country experienced a rather sluggish comeback in industrial production and employment levels (61). The Federal Reserve index of industrial production increased from a 1960 average level of 108.7 to a 1961 average level of only 109.7 (62), hardly an impressive gain. Bank reserves grew at a moderate pace during these years, and interest rates remained fairly low and stable. Average Treasury Bill yields for 1959, 1960, and 1961 were 3.38 percent, 2.88 percent, and 2.35 percent (63).

As part of this easy policy stance, the Federal Reserve raised Regulation Q ceilings on all but the shortest maturities of time deposits. Thus, as of January 1, 1962, ceiling rates on member bank deposits were: 4 percent for all savings deposits held over one year, 3-1/2 percent for savings deposits held 1-12 months, 4 percent for time deposits over one year, 3-1/2 percent for 6 12 month time deposits, 2-1/2 percent for 3-6 month time deposits, and still only 1 percent for 1 3 month maturity time deposits (64). At the time Q ceilings were raised, the Board had this to say:

> For some time, a number of commercial banks have contended that the 3 percent maximum rate has restricted them in their efforts

> to compete for savings and time deposits. One effect of the action will be to increase freedom of competition and to enable each member bank to determine the rates of interest it will pay in the light of economic conditions prevailing in its area, the type of competition it must meet, and its ability to pay.... To enable member banks so desiring to compete more vigorously to retain foreign deposits that might otherwise move abroad in search of higher returns and thereby intensify an outflow of capital or gold to other countries.... To give member banks all the scope that they may need for a considerable period ahead to provide an added incentive for the savings that will be required in financing the future economic growth that will be essential to expanding job opportunities for a growing population (65).

It appears that many banks which complained of insufficient competitive room under 1961 Regulation Q ceiling levels looked upon such an increase more as a defensive than as an offensive weapon. They claimed to have needed additional interest rate flexibility to meet rate increases posted by various non-bank institutions (66). Individual banks feared that they would experience deposit outflows if they were not allowed to match competitor's rate increases.

With the raising of the ceilings, interest rates on commercial bank time and savings deposits shot up quickly. The average annual interest rate paid on member bank time and savings deposits for 1960 and 1961 was 2.61 percent and 2.73 percent respectively, but jumped to an average rate of 3.23 percent in 1962 (67). Rate increases at banks were only partially defensive maneuvers however. Many were also prompted by what banks had interpreted as a Federal Reserve desire for higher interest rates (68). This desire--real or imagined by commercial bankers--was directly related to the United States' problem child of the 1960's, the international balance of payments.

Payments deficits had become particularly acute in the late 50's and early 60's, aggravated in 1961 by low domestic short-term interest rates. While the latter were conducive to high levels of domestic investment, they were incapable of keeping interest-sensitive short-term capital at home or of attracting such foreign capital here. On October 15, 1962, as part of a larger effort to stem payments problems, interest rates on foreign-owned time deposits at domestic commercial banks were set free from the constraints of Regulation Q (69). Short-term capital flows reversed somewhat as many larger banks offered competitive yields to official foreign depositors.

After 1961, the general level of interest rates slowly edged upward--as shown in Table II-4--and banks needed

TABLE II-4: AVERAGE ANNUAL TREASURY BILL AND BOND YIELDS, AND MEMBER BANK TIME AND SAVINGS DEPOSIT RATES PAID, 1961-1965 (in percent)

DATE	TB	TB	TD
1961	2.35	3.90	2.73
1962	2.77	3.95	3.23
1963	3.16	4.00	3.34
1964	3.54	4.15	3.47
1965	3.93	4.20	3.73

Source: Federal Reserve Bulletin.

additional interest rate room under Q ceilings if they were to continue to bid competitively for funds. Noting this trend, the Board raised Regulation Q ceilings on various categories of bank savings accounts and time deposit accounts in 1963, 1964, and 1965, giving reasons similar to those published at the time of the 1962 increase. These changes as well as the 1962 rate changes are shown in Table II-5.

TABLE II-5: REGULATION Q CEILING RATES ON MEMBER BANK TIME AND SAVINGS DEPOSITS, BY CATEGORY OF DEPOSIT, 1962-1965
(in percent)

TYPE DEPOSIT	1/1/62	7/17/63	11/24/64	12/6/65
SD, 1-12 mo	3.50	3.50	4.00	4.00
SD, over 12	4.00	4.00	4.00	4.00
TD, 1-3 mo	1.00	1.00	4.00	5.50
TD, 3-6 mo	2.50	4.00	4.50	5.50
TD, 6-12 mo	3.50	4.00	4.50	5.50
TD, over 12	4.00	4.00	4.50	5.50

Source: *Federal Reserve Bulletin*.

Commercial banks responded by raising posted interest rates on time and savings deposits such that throughout those years the average interest rate paid on time liabilities steadily increased (see Table II-4). Concurrently, time deposits in banks showed healthy increases in each of these years (70). Indeed, we can see from Table II-6 that 1962 was a banner growth year, that 1963 and 1964 were good years for time deposit growth, and that 1965 was a truly phenomenal year for increases in these bank liabilities--especially when we compare these growth rates with increases in the money stock over the same period.

TABLE II-6: THE MONEY SUPPLY AND COMMERCIAL BANK TIME DEPOSITS, YEAR-END FIGURES, SEASONALLY ADJUSTED, 1961-1965 (in billions)

DATE	MS	% CHANGE	TD	% CHANGE
1961	146.0	3.0	82.7	13.3
1962	148.1	1.4	97.8	18.3
1963	153.6	3.7	112.2	14.7
1964	160.5	4.5	126.6	12.8
1965	168.0	4.7	146.8	16.0

Source: Federal Reserve Bulletin. Percentage changes are our own calculations.

During these years banks and other financial institutions competed aggressively for the funds of individual savers. Banks also were in the market fighting for the more interest-sensitive funds of corporations, State and local governments, and wealthy individuals. It would appear that the increase in Regulation Q Ceilings in each of these years was a contributing factor in the growth of commercial bank time deposits and, indeed, a number of sources suggest strong causal linkages here (71, 72).

The Asset Portfolio

The uses to which banks were putting these funds reflected the sources from which they were getting them and the costs attached thereto. During and immediately after the 1960-61 recession, loan demands at most commercial banks were not particularly strong. Meanwhile time deposits at these institutions were growing rapidly, especially after the interest rate increases in January, 1962. As a result, banks were faced with growing volumes of higher-cost deposits but very little chance to raise lending rates in the face of this unenthusiastic corporate and consumer demand for loans. The earnings squeeze at banks was further aggravated by the traditional lag of bank lending rates behind most other interest rates (73).

Seeking to improve profits, a number of commercial banks turned to broaden their choice of assets (74). Bank holdings of municipal securities, residential mortgages, and consumer credit loans increased markedly after 1962 (75), and as they did, yields on these longer-term assets were pushed downward (76). The increase in bank intermediation of financial resources and its effects on bank asset selection of loans and investments and on the interest rate structure of the economy did not go unnoticed at the Federal Reserve:

> The particular factor initiating the sharp increase in flows to financial intermediaries in 1962 was the...raising of the maximum rates that commercial banks may pay on time and savings deposits. These higher ceilings gave commercial banks leeway to pay rates competitive with those available on direct investments in marketable securities. In particular, they made it possible for banks to offer rates on time deposits and certificates that were competitive with yields on money market instruments...(resulting in an) accelerated flow of funds into time and savings deposits at commercial banks.... In addition to the sharp growth in time and savings deposits, the combination of stimulative monetary policy and a slower-than-usual cyclical growth in business loan demands also left banks with resources that could be allocated to longer-term investments. Faced with the accelerated growth and higher costs of their time and savings deposits, commercial banks began early

> in 1962 to place more emphasis on yield and less on liquidity in their investment policy. They reduced their holdings of lower-yielding Treasury Bills and invested actively in long-term markets. At first their interest was centered in State and local government securities in order to obtain high after-tax yields. This brought about a sharp decline in yields in the State and local government market. As deposit growth continued, banks began to invest heavily in mortgages as well as to lengthen their portfolios of U.S. Government securities.... In practice, therefore, the higher rates on time and savings balances established in 1962 channeled a large volume of short-term funds that would otherwise have been invested in short-term assets into the capital markets, where they helped to satisfy the demands of long-term borrowers (77).

This intermediate period of Regulation Q's history was, then, an active one. Rate increases in 1957, 1962, 1963, 1964, and 1965 apparently allowed commercial banks to continue to attract their share of a growing volume of savings. These increases in Regulation Q, combined with a new willingness of commercial banks to actively compete for savings, combined with the introduction of the certificate of deposit, and combined with sample monetary growth, allowed commercial banks to hold their own in the process of financing economic growth. Indeed, financial intermediation played a bigger part in the savings-investment process of the economy than it had in many previous expansions (78). In the year 1965, financial institutions supplied 85 percent of credit market funds, slightly above the 83 percent supplied from 1961-1964, but considerably above the 78 percent supplied during most of the 50's (79).

The benefits of increased financial intermediation to the economy (increased competition, a wider array of financial alternatives to savers, and decreased costs of investment), appeared to outweigh the potential disadvantages (narrower holding of financial claims on investors, and increased illiquidity of financial intermediaries) during the 1961-65 period. The economy experienced rapid real economic growth, declining unemployment levels, and a price stability unknown for many previous years

The Prelude to Inflation

Unfortunately, all these good things were destined to come to an end. Starting in late 1964 and early 1965, prices began to creep upward as the pace of spending in all sectors of the economy quickened (80). Early in 1965, Federal Reserve policy shifted toward moderate restraint, and Chairman Martin came forth with his famous "brinkmanship" warning (81). Market conditions tightened all through 1965 and for the first time in five years, mortgage interest rates began rising (82). In late 1965, the Federal Reserve clamped down a little harder, raising the discount rate from 4 to 4-1/2 percent (83). While the Board raised some Regulation Q ceilings in December, 1965 (84), this apparently was more a move to keep commercial banks from experiencing deposit losses than it was permission or encouragement for them to continue to increase time deposit holdings.

By the end of the year, the economy was truly beginning to boom. During 1965 and 1966, market rates of interest had increased rapidly. The average annual Treasury Bill rates for 1963-66 were 3.16 percent, 3 54 percent, 3.93 percent, and 4.85 percent (85). Restrictive monetary policy had slowed money supply growth to an annual average increase for 1966 of only 2.2 percent (86). Concurrently, bank liquidity cushions sank to historically low levels due to banks' vigorous lending and investing activities (87); time deposits were increasingly difficult to attract as numerous holders of these instruments shifted funds into real expenditures or directly into market instruments (88); and loan demands mushroomed.

Banks responded to these financial pressures by increasing their lending rates, raising the prime rate to 5.00 percent on December 6, 1965. This increase was followed closely by additional ones to 5.50 percent (March 10, 1966), to 5.75 percent (June 29, 1966), and to 6.00 percent (August 16, 1966)--the highest prime rates since the 1920's (89). Banks also increased time deposit interest rates in hopes of maintaining these deposits at high levels such that the average interest rate paid on member bank time and savings deposits rose to 4 11 percent for the year 1966 (90). Never in modern history had banks had to pay such high rates for these liability fund sources.

Non-bank financial intermediaries were not unscathed by these happenings. Savings and loan associations in particular were caught between the restrictive policy of the Federal Reserve, the Federal Home Loan Bank Board, high market interest rates, and relatively low yields on their assets (predominately older mortgages with low returns) (91). Non bank financial institutions were perhaps more at the mercy of the market than were commercial banks because of the former's limited flexibility in adjusting either the asset or liability portfolio in response to changed economic conditions.* Something surely had to give.

Current Use of Regulation Q: 1966-1970

The Boom Years

The period from 1966 through 1970 was, in general, a very vigorous one economically. Demands for funds by the various spending sectors reached new highs, often outstripping the growing supply of new funds. Inflation was an ever present problem, and interest rates rose to unprecedented levels. The Federal Reserve authorities, busy regulating such an exuberant economy, crossed into new fields of policy application and monetary tool utilization. These were truly five dynamic years in the evolution of our monetary history.

Levels of saving, investment, and industrial growth were quite high for 1965-70. Production indices for 65-69 measured the level of real industrial production at 14[illegible].4, 156.3, 158.1, 165.5 and 172.8 (92). Good gains in economic growth were registered for all years except 1967, when a slackening of economic activity early in the year pulled down any large net increases for the twelve-month period.

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*A more complete discussion of this problem is included later.

Demands for funds to finance this growth were tremendous. The business community contributed most heavily to the demand for financial resources. Although primarily for investment purposes (93)--plant and equipment outlays for 1966 exceeded 1965 expenditures by more than 16 percent (94) --businesses also needed external funds to meet the burden of increased taxes and customer credit demands (95). Only in 1967 and 1970 did these demands abate to any appreciable degree, and then partially in response to extremely tight funds markets in the preceding years (96).

Household expenditures for mortgage and consumption purposes were quite high in 1966, 1968, and 1969, slumping only in 1967 and 1970 (97). The government sector of the economy added its financial requirements to those of the private economy in their attempt to support the Vietnam War effort, to push on with the Great Society programs, to maintain foreign aid levels, and to meet the spiraling costs of the crumbling city (98).

Such fund requirements weighed heavily on the available supply of internally generated funds in each sector. Indeed, most sectors were forced to seek outside financing during much of this period, with the result that except for parts of 1966 and 1969 when credit stringency involuntarily scaled loan demands back, borrowing in the economy grew at a faster rate than GNP (99). As a percentage of GNP, the level of borrowing was as follows: Quarter III, 1965 through Quarter IV, 1966--8.6 percent; Quarter I through Quarter II, 1967--8.1 percent; Quarter III, 1967 through Quarter II, 1968--10.2 percent; Quarter III through Quarter IV, 1968--10.9 percent; the year 1969--7.9 percent; and Quarter I, 1970 through Quarter I, 1971- 8.5 percent (100). We note that during the 1960-64 period the private sector (business and consumers only) borrowed approximately $38 billion per year in the market, but pushed this figure to $59 billion for 1966-67, and to a whopping $67 billion for 1967-68 (101).

That was not only a lot of borrowing, more importantly, it was a large increase in the amount borrowed over a relatively short period of time. As we would expect, the financial world did not ignore these huge fund requirements. From Table II 6 we can see the results of these pressures as they are reflected in representative interest rates and in price indices in the economy.

Only in 1967 and 1970 did short term interest rates fall as the recessions of these years dictated an easier monetary policy and as investors shifted to the shorter end of the maturity distribution in hedging against financial losses under such abnormally uncertain market conditions (102).

TABLE II-7: U.S TREASURY BILL AND BOND YIELDS, ANNUAL AVERAGES, AND WHOLESALE AND RETAIL PRICE INDICES, ANNUAL AVERAGES*, 1964-1970

DATE	BILL	BOND	WHOLESALE	RETAIL
1964	3.54%	4.15%	100.5	108.1
1965	3.93	4.20	102.5	109.9
1966	4.85	4.65	105.9	113.1
1967	4.30	4.85	106.1	116.3
1968	5.33	5.25	108.8	121.2
1969	6.66	6.12	113.0	127.7
1970	6.39%	6.59%		

*Seasonally adjusted, 1957-59=100.

Source. Yields from "Money Market Yields," Federal Reserve Bulletin, selected years. Indices from Federal Reserve Bulletin (August, 1970).

The demand for long-term funds by government and by business corporations never abated during this period and long-term market rates of interest continued their climb. In 1967, one of the less exuberant of the boom years, the market absorbed record levels of corporate and municipal securities (103), and bond yields rose to post Depression highs.

We can see from Table II 7 that 1966-70 were years of undistinguished price stability. Wholesale and retail price increases, continuing through both boom and mini-recession, were a central concern of the monetary authorities. An almost impenetrable inflationary psychology gripped the spending patterns of the American economy, affecting everything from business investment plans to loan rates to stock market buying (104). The economy was truly "overheated for much of the 1965-1970 period.

Commercial banks were very much in the center of financing economic growth in the '60's. They reacted to the strong demands for funds by raising their time deposit offering rates (105), by raising lending rates, and by rationing credit among prospective borrowers (106). From Table II-8 we get an indication of the flexible use banks made of changes in the prime rate as bank management tried to follow the trend of economic activity and the sway of the funds markets in their lending policies. The pulse of the economy was rapid during these five years, with all sectors contributing their share to a boom and inflation of historic note. Interest rates, price levels, and commercial bank policies told the story of the 1960's prosperity.

TABLE II-8: COMMERCIAL BANK PRIME RATES, 1964-1970 (in percent)

EFFECTIVE DATE	RATE
August 23, 1960	4.50
December 6, 1965	5.00
March 10, 1966	5.50
June 29, 1966	5.75
August 16, 1966	6.00
January 26, 1967	5.50-5.75
March 27, 1967	5.50
November 20, 1967	6.00
April 19, 1968	6.50
September 25, 1968	6.00-6.25
November 13, 1968	6.25
December 2, 1968	6.50
December 18, 1968	6.75
January 7, 1969	7.00
March 17, 1969	7.50
June 9, 1969	8.50
March 25, 1970	8.00

Source: *Federal Reserve Bulletin*.

The Role of Monetary Policy

It is perhaps the understatement of the decade to say that the Federal Reserve System was aware of these financing pressures. The monetary authorities were terribly concerned by the high rates of inflation, by the rapid expansion of business loans, by the differential growth rates of commercial banks versus nonbank financial intermediaries, by the slumping mortgage market, and by evidences of excessive interest rate competition at banks (107). Believing most of these problems to be a product of excess aggregate demand and acknowledging that monetary policy is reasonably well-suited to do battle with demand-pull inflations, the Fed became actively engaged in stabilization activities after 1965 (108).

In due course, the Board utilized all of its available monetary devices: in the five years from 1966-1970, pursuing varying degrees of open market restrictiveness, approving requests for discount rate increases, increasing reserve requirements on member bank time and savings deposits, refusing to raise some Regulation Q ceilings and lowering others, and pressuring commercial banks to exercise appropriate lending control. In Table II-9 we see the Fed's use of changes in the discount rate applicable to member bank borrowing. We can trace the momentum of the boom as it builds in these figures, the marked tightening at the end of 1965, the economic slump in early 1967, the strengthening

TABLE II-9: NEW YORK FEDERAL RESERVE BANK DISCOUNT RATES, 1960-1970 (in percent)

EFFECTIVE DATE	RATE
August 12, 1960	3.00
July 17, 1963	3.50
November 24, 1964	4.00
December 6, 1965	4.50
April 7, 1967	4.00
November 20, 1967	4.50
March 22, 1968	5.00
April 19, 1968	5.50
August 30, 1968	5.25
December 18, 1968	5.50
April 4, 1969	6.00
May 31, 1970	6.00

Source: Federal Reserve Bulletin.

of economic activity and tightening of the money markets throughout the remainder of 1967 and into 1968, the leveling-off period in 1968, and the resumption of fervid economic activity in 1969.

Monetary policy clearly leaned against prevailing market pressures, the latter indicated by changing interest rate and price levels in the economy (see Table II-7). The Fed's discount rate is plotted against representative market interest rates from 1964 through 1970 in Figure II-1.

As mentioned earlier, the Board also employed changes in reserve requirements against member bank time, savings, and demand deposits in their effort to stem the inflation of the last half of the 1960's. In discussing the efficacy and usefulness of various Federal Reserve tools, it is often suggested that changes in reserve requirements on bank deposits are, because of their blunt and clumsy nature, rather infrequently used. The reader will note from Table II-10

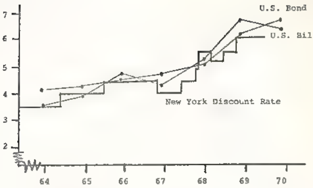

FIGURE II-1: THREE MONTH U S. TREASURY BILL AND THREE-FIVE YEAR U.S. TREASURY BOND YIELDS AND NEW YORK FEDERAL RESERVE BANK DISCOUNT RATES, 1964-1970

that while the Board changed demand deposit reserve requirements sparingly, it tended to move reserve requirements against time and savings deposits around quite a bit. The latter activity could be explained by the important role that commercial bank time liabilities had begun to play in bank growth since 1961. Throughout the period, reserve requirements on savings deposits and small holdings of time deposits (less than $5 million) were reduced and the requirements were steadily increased for large holdings of time deposits--supposedly to favor small banks use of time funds and to discourage larger banks from attracting huge volumes of these deposits, thereby escaping monetary restraint.

TABLE II-10: MEMBER BANK RESERVE REQUIREMENTS AGAINST SAVINGS, TIME, AND DEMAND DEPOSITS, 1962-1969 (in percent)

EFFECTIVE DATE	DD--RC[a]		DD--C[b]		SD[c]	TD[d]	
July 28, 1962	16-1/2	16 1/2	12	12	5	5	5
October 25, 1962	16-1/2	16-1/2	11	11	4	4	4
July 14, 1966	16-1/2	16-1/2	12	12	4	4	5
September 8, 1966	16-1/2	16 1/2	12	12	4	4	6
March 2, 1967	16 1/2	16 1/2	12	12	3-1/2	3-1/2	6
March 16, 1967	16-1/2	16-1/2	12	12	3	3	6
January 11, 1968	16-1/2	17	12	12-1/2	3	3	6
April 17, 1969	17	17-1/2	12-1/2	13	3	3	6

[a] Demand deposits at reserve city banks; less than and more than holdings of $5 million.

[b] Demand deposits at country banks; less than and more than holdings of $5 million.

[c] Savings deposits at member banks.

[d] Time deposits at member banks; less than and more than holdings of $5 million.

Source: Federal Reserve Bulletin.

In recognition of the possibility that an abnormally low level of Regulation Q rates could slow commercial bank time deposit expansion (109) and deeming this desirable, the Fed lowered selected ceiling rates on member bank time and savings deposits for the first time since 1936 on July 20, 1966, and again on September 26, 1966. These changes were then made to slow commercial bank expansion of credit, to stop interest rate wars between commercial banks and non-bank financial institutions (110), and to even up the "unfair competition" between these intermediaries (111). The Board raised some of these ceilings in April, 1968, and in January and February, 1970, to allow commercial banks a bit more

TABLE II-11: REGULATION Q CEILINGS ON MEMBER BANK TIME AND SAVINGS DEPOSITS, BY CATEGORY OF DEPOSIT, 1965-1970
(in percent)

TYPE DEPOSIT/DATE	1	2	3	4	5	6
[a]SD, 1-12 mo	4.00	4.00	4.00	4.50	4.50	4.50
SD, over 12	4.00	4.00	4.00	4.50	4.50	4.50
[b]MMTD, 1-3 mo	4.00	4.00	4.00	4.00	4.50	4.50
[b]MMTD, 3-6 mo	5.50	5.00	5.00	5.00	5.00	5.00
[b]MMTD, 6-12 mo	5.50	5.00	5.00	5.00	5.00	5.00
[b]MMTD, 1-2 yr	5.50	5.00	5.00	5.00	5.00	6.50
[b]MMTD, over 2 yr	5.50	5.00	5.00	5.00	5.00	5.75
[c]SMTD, 1-3 mo	5.50	5.50	5.00	5.00	5.00	5.00
[c]SMTD, 3-6 mo	5.50	5.50	5.00	5.00	5.00	5.00
[c]SMTD, 6-12 mo	5.50	5.50	5.00	5.00	5.00	5.00
[c]SMTD, 1-2 yr	5.50	5.50	5.00	5.00	5.50	5.00
[c]SMTD, over 2 yr	5.50	5.50	5.00	5.00	5.75	5.75
[d]SMTD, 1-2 mo	5.50	5.50	5.50	5.50	6.25	6.25
[d]SMTD, 2-3 mo	5.50	5.50	5.50	5.75	6.50	6.50
[d]SMTD, 3-6 mo	5.50	5.50	5.50	6.00	6.75	6.75
[d]SMTD, 6-12 mo	5.50	5.50	5.50	6.25	7.00	7.00
[d]SMTD, over 12 mo	5.50	5.50	5.50	6.25	7.50	7.50

[a]Savings deposits, all denominations.
[b]Multiple maturity time deposit, all denominations.
[c]Single maturity time deposit, less than $100,000.
[d]Single maturity time deposit, more than $100,000.
1--12/6/65 2--7/20/66 3--9/26/66 4--4/19/68 5--1/21/70
6--2/26/70
Source: Federal Reserve Bulletin.

competitive room, especially in their battle for interest-sensitive, larger-denomination, time deposits (112). These changes in the Fed's Regulation Q ceilings are shown in Table II-11.

The use of traditional monetary tools (changes in reserve requirements, discount rates, and open market policy) plus added utilization of some others (Regulation Q) did not, however, contain the booming economy. Despite the lack of fiscal cooperation (113), the Fed was nonetheless charged with the task of stabilizing economic growth and price levels, and they simply were not meeting this challenge in 1966. After the expanded powers given the Board by the Interest Rate Control Act of 1966 (114) failed to get the job done, the Fed resorted to more aggressive tactics.

For the first eight months of 1966, commercial bank loans and investments grew by 8 percent, bank loans by 12 percent, and bank business loans by 20 percent (115). While it was both profitable (116) and traditional (117) for banks to lend selectively to their business customers as credit tightened in the economy, the Fed realized that if it was to stop inflation such rates of growth could not be tolerated. The monetary authorities were also concerned with bank cutbacks in acquisitions of other assets as these institutions continued to favor loans over investments, and business loans over other loans in their portfolio policy (118). Accordingly, the Board broke with its low-keyed tones of moral suasion (119) and on September 1, 1966 directed the Presidents of the twelve Federal Reserve Banks to send a letter to all member banks requesting cooperation in the curtailment of loans to businesses. The messages of the letter were (120):

> (1). while business loan demand was intense and most individual loans appeared worthwhile, business borrowing from banks was partially responsible for mounting inflationary pressures;
>
> (2). some bank lending to business was occurring at the expense of other assets, namely municipals and mortgages;
>
> (3). that curtailment of investments and nonbusiness loans could contribute to "disorderly conditions in other credit markets;"
>
> (4). that member banks choosing to adjust to any deposit losses by cutting business loans instead of cutting security holdings further would be afforded special considerations at the Fed discount window.

Such tactics were clearly last ditch efforts on the part of the monetary authorities to gain control over commercial bank credit expansion.

Efforts on the part of the monetary authorities to contain inflation during this and the next four years were only partially successful. Businesses switched part of their borrowing to the open market (121), but in general demands for funds continued their strong upward trend. Throughout the remainder of the period, 1966-1969, except for a brief respite in early 1967, inflation and spending continued their dizzying climb. Only less optimistic expectations by businesses and consumers slowed spending and borrowing in 1970. How Federal Reserve stabilization policy affected these expectations and hence how much credit we can give to the monetary authorities in ending this tremendous economic burst we do not now know. We may never know with any degree of accuracy, but we suspect that the combined thrust of these several monetary actions was not unimportant in turning the economy around.

Financial Disintermediation and the Mortgage Market

Periods of rapid economic growth, especially those accompanied by price inflation and high interest rates, involve certain structural adjustments in our system. One of those adjustments we call financial disintermediation--the loss of intermediary deposits as funds move from financial institutions directly into the open market. Daniel Brill, a staff economist at the Fed, explains that whenever strong credit demands and strong monetary restraint combine,

> interest rates in financial markets move up rapidly, more rapidly than financial institutions can accommodate by adjusting their portfolios and the returns they can offer to savers. In such periods, more sophisticated savers tend to move their funds out of institutions and directly into financial instruments, purchasing securities principally of the Federal government and of State and local governments (122).

Another Federal Reserve explanation of this process is that if

> demands for credit experience an autonomous increase, market interest rates would tend to rise. Such rate increases on market securities would need to be large enough to attract additional lending from "other domestic sectors." Those higher rate levels would tend to make market securities more attractive relative to holdings of deposits. Nominal interest rates on demand deposits are fixed at zero, while rates paid on savings accounts at commercial banks and thrift institutions tend to fluctuate much less than rates on market securities....The more market interest rates rise, the more extensive the process of "disintermediation" becomes (123).

To complicate matters, given no change in economic conditions, the process of financial disintermediation is self-regenerative. The loss of depository funds usually necessitates a cutback in the volume of institutional purchases of longer-term capital market instruments and/or cutbacks in loans both of which tend to push long-term interest rates and eventually the whole interest rate structure even higher (124).

To be sure, most of the funds lost from commercial banks will return to the banking system as they are redeposited by other financial intermediaries, the Treasury, municipal agencies, or corporation. But to the extent that this reshuffling occurs from time deposits to demand deposits, a shrinkage of bank credit is necessary. And at a minimum, this reshuffling entails costly portfolio adjustments for banks which may lead them to stay less fully invested in the future--a result which also tends to push interest rates upward. Nonbank financial intermediaries are not so fortunate as lost funds tend to stay lost until rate differentials again become favorable.

It seems only logical to ask why financial institutions such as savings and loan associations, mutual savings banks, and to some extent, commercial banks cannot match the market's interest rate flexibility? Why can they not change offering rates by as much or as quickly as the market? There seem to be two reasons, one institutional and one statutory.

The first hindrance to rate flexibility of these intermediaries is a portfolio problem. Assuming that an institution wants to raise rates of return on its liabilities, any such increases, because they raise costs, will tend to lower profit margins at least temporarily. Because these rate hikes apply to all deposits of that class -both those existing as well as any new deposits attracted -while higher returns on assets can only be earned on the volume of new funds attracted and invested (minus reserves set aside against these new liabilities), profit margins are likely to suffer permanently. This is a particularly distasteful alternative to stockholders whose earnings suffer* until the institution can readjust its liability and asset portfolios. Because of these problems, many financial institutions hesitate to match rising market rates of interest.

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*It is possible that higher costs, if they are high enough, could cause earnings to become negative. In this case the net worth of the institution would have to absorb the losses. This is a most undesirable financial result, but one which many savings and loan associations discovered in 1966 was not so very far fetched. For a further discussion of portfolio inflexibility and alternatives open to financial institutions, see Edward C. Ettin and Barbara Negri Opper, Consumer Savings and Thrift Institutions (Washington: Federal Reserve Board of Governors, 1970).

While inflexible portfolios are a potential problem for commercial banks and showed themselves to be sorespons in commercial bank growth in the 1960's, they caused even more serious problems for nonbank financial institutions (125). These latter intermediaries have been less successful than commercial banks at differentiating deposit claims. As a result any rate increases apply to a very large portion of total deposits (shares)--which gets to be an expensive method of retaining old deposits or attracting new ones. To illustrate the uneven impact of disintermediation on banks and their competitors, let us assume that a savings and loan association posts a 1/4 percent increase on deposit shares of a certain variety, but that variety constitutes 90 percent of total liabilities of the firm, while a commercial bank posts a 1 percent increase on their 6 month negotiable certificate of deposit which constitutes only 5 percent of the bank's total liabilities. The former increase, while nominally much smaller than the increase made at the commercial bank, will almost without exception be more costly to the SLA.

Furthermore, savings and loan associations and mutual savings banks cannot look to their asset portfolio for many funds during a boom. Their portfolios, unlike those of commercial banks, consist almost wholly of mortgages--long-term, poorly marketable instruments. Any funds generated by mortgage amortization payments are almost always immediately placed in new mortgages, and after market interest rates have exceeded asset yields on their mortgage-heavy portfolios, nonbank financial institutions are hesitant to sell these assets in order to raise funds. And until quite recently, nonbank financial intermediaries had few outlets for the sale of mortgages. Thus, because of reinvestment policies, the average length to maturity, and the low marketability of savings and loan association and mutual savings bank assets, rapidly changing levels of interest rates left these institutions at the mercy of the market during much of the 1960's. Nonbank financial intermediary asset problems, combined with poorly differentiated liabilities, forces us to conclude that these intermediaries fare quite badly in prosperous times. Commercial banks, because they have these problems to a lesser degree, tend to do better than thrift institutions in a boom, but are not isolated from the process of disintermediation and the readjustments it entails.

As if the portfolio problems besieging these institutions during a boom were not enough, the Federal Reserve System, via a restrictive use of Regulation Q ceilings on time and savings deposits, insures commercial banks (and after 1966, other financial intermediaries) of slower deposit growth (126). Comparing figures from Tables II-6 and II-10, it appears that the Fed prohibited commercial banks from raising interest rates on time deposits at precisely those times when they (a) would need to raise deposit rates the most (i.e., at the top of the boom) and, (b), would be thought to be having natural difficulty in keeping up with the open market because of the speed and level to which market interest rates were advancing.

No doubt, these changes in Regulation Q eliminated the possibility of a rate war among commercial banks or between commercial banks and nonbank financial intermediaries, but

> restricting increases in deposit interest rates when rates of return on competing assets rise is similar in effect to lowering the allowable deposit interest rate when other rates are stationary (127).

Lowering the maximum rates of return available to depositors and shareholders at financial intermediaries during a period of fierce competition for scarce financial resources hardly seems to be a policy conducive to high rates of financial intermediary growth. With the Regulation Q usage, the Fed opened itself up to all sorts of criticisms; from cries of protecting weak nonbank institutions (when Q was used only on banks in 1966), to subsidizing the mortgage market, to simple charges of fostering economic inefficiency (128).

One of the prime reasons given for lowering Regulation Q at commercial banks was to shield deposit losses at their competitors, savings and loan associations and mutual savings banks. By doing so, the Fed hoped to put a support under the lagging mortgage industry, traditional scapegoat of prosperous times, high prices, and high interest rates. Because mortgages are long-term, fixed-rate debt instruments wherein interest costs loom large as a percentage of the total obligation, they are singularly sensitive to booms anyway (129).

They are doubly sensitive because the vast majority of mortgage funding comes through financial institutions--savings and loan associations, mutual savings banks, and to some extent, commercial banks--those firms which naturally tend to lose the savings race during rapid expansions. After 1966, the same sort of deposit rate ceilings were placed on nonbank financial intermediaries as on commercial banks (130).

Because of traditional institutional portfolio problems and because of restrictive levels of Regulation Q ceilings, disintermediation did indeed occur at times during the 1966-1970 period. The proportion of credit flows that was intermediated by institutions fell to 66 percent in 1966, down considerably from 85 percent in 1965 (131). In 1965, commercial banks supplied 40 percent of all funds raised by nonfinancial borrowers, but this share dropped to 20 percent for the first three quarters of 1966, and to a low 7 percent for the third quarter of the year (132). Consumers allocated approximately 25 percent of their net financial savings directly to the open market in 1966, up remarkably from the 3 percent average of 1961-65 (133). Disintermediation was somewhat of a problem for commercial banks in 1966, but was much more serious for nonbank financial intermediaries in that year (134).

All throughout the remainder of the late 60's the possibility of disintermediation haunted financial institutions. And when economic activity surged forward, when interest rates climbed, and when Regulation Q rates were frozen at non-competitive levels, this process actually made itself felt on commercial bank growth (135). But in 1967, in parts of 1968, and in 1970, because of the opposite types of forces, commercial banks and nonbank financial institutions had little problem competing for funds in the financial markets. Time deposits grew rapidly and pressure was lessened in the market for mortgage funds (136).

Responding to changing economic conditions, the Fed raised Regulation Q ceilings at member banks (other regulatory agencies followed suit) in 1968 and again in 1970. The authorities recognized that while interest rate ceilings on time deposits at commercial banks and at savings and loan associations eliminated rate wars between them, they also now knew that these institutions taken together would lose funds to the open market unless they were allowed to compete, at their discretion, by raising time liability rates of return whenever necessary.

NOTES

1. Ernest Bloch, "Two Decades of Evolution of Financial Institutions and Public Policy," Journal of Money, Credit, and Banking (May, 1971), p. 558.

2. See Stephen H. Axilrod and Ralph A. Young, "Interest Rates and Monetary Policy," Federal Reserve Bulletin (October, 1962), pp. 1110-1137 for an interesting discussion of some of these issues.

3. Milton Friedman, "Controls on Interest Rates Paid by Banks," Journal of Money, Credit, and Banking (February, 1970), p. 18.

4. Albert H. Cox, Jr., Regulation of Interest Rates on Bank Deposits, Michigan Business Studies (Ann Arbor: University of Michigan, 1966), pp. 1-12; and Albert H Cox, Jr., "Regulation of Interest on Deposits: An Historical Review," Journal of Finance (May, 1967), pp. 274-7.

5. Lawrence S. Ritter, Regulation Q: Issues and Alternatives (Chicago: Association of Reserve City Bankers, 1965), p. 7.

6. Jules I. Bogen and Herman E. Krooss, Savings and Other Time Deposits in Commercial Banks (Chicago: Association of Reserve City Bankers, 1962), p. 23.

7. Larry Mote, "Competition in Banking: The Issues," Commercial Banking: Structure, Competition, and Performance (Chicago: Federal Reserve Bank of Chicago, August, 1967), reprinted in Paul F. Jessup, Innovations in Bank Management, Selected Readings (New York: Holt, Rinehart, and Winston, Inc., 1969), pp. 421-22.

8. Cox, Regulation of Interest Rates, pp. 1-12.

9. Ritter, pp. 6-7.

10. Mote, pp. 423-4.

11. Cox, Regulation of Interest Rates, Chapters 1 and 2.

12. See Cox, Regulation of Interest Rates, pp. 1-30, for a full account of Congressional debates on the passage of the authority and the history of interest rate ceilings.

13. Bogen and Krooss, p. 23.

14. Hyman Minsky, "The Crunch of 1966--Model for New Financial Crises," Trans-action (St. Louis: Washington University Press, March, 1968), p. 44.

15. American Bankers Association, The Problems of Commercial Bank Liquidity (New York: 1957), p. 1. See also Ritter, p. 8; and Bogen and Krooss, p. 23.

16. Bogen and Krooss, p. 23.

17. Jules I. Bogen and Paul S. Nadler, The Competitive Position of Commercial Banks (Chicago Association of Reserve City Bankers, 1959), pp 18, 31.

18. American Bankers Association, The Commercial Banking Industry (Englewood Cliffs: Prentice-Hall, 1962), p. 53. See also Bogen and Krooss, p. 23.

19. Richard Fieldhouse, Certificates of Deposit (Boston: Bankers Publishing Company, 1962), p. 4.

20. American Bankers Association, "The Problems, p. 3. See also Paul S. Nadler, "Your Competitors' Problems," Banking, (March, 1963), p. 47.

21. American Bankers Association, The Problems, p. 3; and Nadler, "Your Competitors' Problems," p. 47.

22. Howard D. Crosse, "Liquidity--Concepts and Instruments," Management Policies for Commercial Banks (New York: Harper and Row Publishers, 1963), p. 85. See also William M. Martin, Jr., "Statement to Congress," Federal Reserve Bulletin (April, 1969), p. 326; and American Bankers Association, The Problems, p. 3.

23. Peter A. Frost, "Comments on the Session on the Evolution of Financial Institutions," Journal of Money, Credit, and Banking (May, 1971), p. 595. We really have no way of knowing whether Frost's last remark is true or not. The U. S. Bill and Bond and average time deposit rates were:

Date	Bill	Bond	TD
1945	37	1.60	.85
1946	.37	1.45	.82
1947	.60	1.59	.84
1948	1.04	2.00	.87
1949	1.10	1.71	.89
1950	1.22	1.84	.91
1951	1.52	2.57	1.02

Source. *Federal Reserve Bulletin*

From these nominal values, it would have seemed cheaper for banks to have attracted time deposits any time after 1947, and perhaps some time prior to then too. But we do not have the *marginal* interest cost of time deposits for these years. It is doubtful that banks had them either, since they had no idea what their demand for these liabilities was like. We would suggest, however, that such marginal interest costs were probably considerably above these U. S. Government yields for two reasons: (1) most banks did not have the principle of deposit differentiation down to a science yet, such that changing the interest rate on one category of bank time deposit meant changing it on a large volume of the bank's deposits--hence a relatively large marginal cost for those deposits which were attracted in to the bank. (2) Commercial banks did not raise funds in this way, and if we can assume some element of profit maximization as a driving force in private banking in this country, we can assume that they would have used interest rates to attract deposits if it was, in fact, a cheaper source of funds.

24. Crosse, p. 85. Treasury Bond yields for 1950-55 were 1.84%, 2.57%, 2.68%, 2.93%, 2.55% and 2.79% (*Federal Reserve Bulletin*, 1951-1956 issues).

25. "Time and Savings Deposits and Financial Flows," *Federal Reserve Bulletin* (December, 1966), p. 1740; American Bankers Association, *The Problems*, pp. 1, 3, 6, 74; Martin, pp. 326-7; and Nadler, p. 47.

26. J. L. Robertson, "Statement to Congress," *Federal Reserve Bulletin* (June, 1966), p. 790, Ritter, p. 8; and Friedman, pp. 15-16.

27. *Federal Reserve Bulletin* (May, 1958).

28. Ritter, p. 9.

29. American Bankers Association, *Response to Change* (New York: 1965), p. 66.

30. "Short Term Notes and Banking Competition," *New England Business Review* (Boston: Federal Reserve Bank of Boston, December, 1964), reprinted in Jessup, pp. 455 6.

31. American Bankers Association, *The Commercial Banking Industry*, p. 78.

32. *Ibid*., p. 78.

33. For a discussion of this trend and its implications, see "Sources of Commercial Bank Funds," *Economic Review* (Cleveland Federal Reserve Bank of Cleveland, November, 1965), reprinted in Jessup, p. 152; Paul S. Nadler, "How Does Your Savings Situation Compare With Other Banks?" *Banking* (October, 1962), p. 41; Paul S. Nadler, "Commercial Banking in the '60's," *Journal of Finance* (May, 1961), p. 229; and "Time and Savings Deposits," p. 1740.

34. Nadler, "Commercial Banking," p. 229.

35. *Ibid*., p. 229.

36. J. L. Robertson, "The Changing World of Banking," *Banking* (March, 1965), p. 45; and Clifton Kreps and David T. Lapkin, "Public Regulation and Operating Conventions Affecting Sources of Funds of Commercial Banks and Thrift Institutions," *Journal of Finance* (May, 1962), p. 290.

37. Edward C. Ettin and Barbara Negri Opper, *Consumer Savings and Thrift Institutions* (Washington: Federal Reserve Board of Governors, 1970), p. 1, "Time and Savings Deposits," p. 1740; Ritter, pp. 9-10; and Kreps and Lapkin, p. 291.

38. See Ritter, p. 8, Nadler, "How Does Your Savings Situation Compare," p. 41; Nadler, "Commercial Banking," pp. 227 8, Nadler, "Your Competitors'," p. 48; American Bankers Association, *Response*, pp. 6, 69; Bogen and Nadler, p. 5; and "Time and Savings Deposits," p. 1740.

39. Gloria Shatto, *Corporate Demand for Liquid Financial Assets, 1947-1962* (Rice University, 1966); Jerry W. Lee, *Changing Liquidity Patterns in the American Banking System* (University of Florida 1969), pp. 86-7; Paul S Nadler, "The Outlook for the CD in the Boom Days Ahead," *Banking* (June, 1964), p. 45; Paul S. Nadler, "Discussion," *Journal of Finance* (May, 1969), p. 291; Nadler, "Your Competitors' Problems," p. 48; Nadler, "How Does Your Savings Situation Compare," p. 41; "Savings," *Banking* (July, 1965),

p. 85, American Bankers Association, *Response*, pp. 66, 69; "Time and Savings Deposits," p. 1740; "Short Term Notes," p. 456; "Sources of Commercial Bank Funds," pp. 155-57.

40. Ritter, p. 10.

41. American Bankers Association, *Response*, p. 71; Frost, p. 597; Bloch, p. 555, and "Time and Savings Deposits," pp. 1740-41.

42. *Federal Reserve Bulletin* (July, 1971).

43. "Interest Rates in Capital Markets," *Federal Reserve Bulletin* (August, 1965), p. 1054 and George W. Mitchell, "Statement to Congress," *Federal Reserve Bulletin* (December, 1965), p. 1686. See also "Time and Savings Deposits," p. 1740; American Bankers Association, *The Commercial Banking Industry*, p 53; "Sources of Commercial Bank Funds," p. 160; American Bankers Association, *Response*, pp. 62, 68; Robertson, "The Changing World," p. 45; and Ettin and Opper, p. 1.

44. Daniel H. Brill, "The Role of Financial Intermediaries in U. S. Capital Markets," *Federal Reserve Bulletin* (January, 1967), p. 27. See also William F. Kelly, " The Outlook and Condition of Business," *Banking* (January, 1964), p. 35, "Sources of Commercial Bank Funds," p. 160; Robertson, "Statement," p. 790; and Lee, pp. 80-112.

45. Kelly, p. 35.

46. Lyle E. Gramley and Samuel B. Chase, Jr., "Time Deposits in Monetary Analysis," *Federal Reserve Bulletin* (October, 1965), p. 1380.

47. Robertson, "Statement," p. 790; American Bankers Association, *Response*, p. 62; and "Interest Rates in Capital Markets," p. 1054

48. Fred H. Klopstock, "Euro-Dollars in the Liquidity and Reserve Management of U. S. Banks," *Monthly Review* (New York Federal Reserve Bank of New York, July 1968), reprinted in Jessup, p. 491. See also "Sources of Commercial Bank Funds," pp. 160, 164, 165, American Bankers Association, *The Commercial Banking Industry*, p. 53, Robertson, "Statement," p. 790; and Lee, pp. 80-112.

49. Ettin and Opper, p. 5.

50. Frost, p. 598.

51. Bogen and Krooss, p. 7.

52. Caroline H. Cagle, "Changes in Time and Savings Deposits," *Federal Reserve Bulletin* (April, 1966), p. 468.

53. Robertson, "Statement," p. 790.

54. Paul S. Nadler, "The Use and Mis-use of CD's," *Banking* (July, 1965), p. 51. See also William M. Martin, Jr., "Statement to Congress," *Federal Reserve Bulletin* (March, 1965), p. 408; "Negotiable Time Certificates of Deposit," *Federal Reserve Bulletin* (April, 1963), p. 458; "Time and Savings Deposits in the Second District Since the Change in Regulation Q," *Monthly Review* (New York: Federal Reserve Bank of New York, April, 1963), p. 56; Lee, p. 85; and Cagle, p. 466.

55. John Davenport, "The Strain is on the Banks," *Fortune* (July 1, 1966), p. 97. See also Robertson, "Statement," p. 790; Martin, "Statement" (March, 1965), p. 408; Cagle, p. 466; and Lee, p. 85.

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61. "Monetary Policy, Bank Credit, and Money," *Federal Reserve Bulletin* (July, 1962), p. 790. See also "Interest Rates in Capital Markets," p. 1061.

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71. "Interest Rates in Capital Markets," p. 1061

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81. "Outlook for Money and Credit," Banking (May, 1965), p. 32.

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83. *Federal Reserve Bulletin* (March, 1967).

84. See *Federal Reserve Bulletin* (March, 1967) for the increases in Regulation Q.

85. Calculated from monthly rates as published in the *Federal Reserve Bulletin*, selected issues, 1963-67.

86. From $168 0 billion to $171.7 billion during the year ending 1965 to 1966. See *Federal Reserve Bulletin* (March, 1967).

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88. "Bank Credit," (February, 1966), pp. 152, 159.

89. *Federal Reserve Bulletin* (March, 1967).

90. *Federal Reserve Bulletin* (August, 1967).

91. "Interest Rates in Capital Markets," pp. 1061-2.

92. Industrial Production Index, Annual Average, Seasonally Adjusted, 1957-59=100 from *Federal Reserve Bulletin* (May, 1970).

93. William M. Martin, Jr., "Statement to Congress," *Federal Reserve Bulletin* (April, 1969), p. 326. See also "Digest of the Business Outlook," *Banking* (June, 1966), p. 140; "Recent Capital Market Developments," *Federal Reserve Bulletin* (May, 1968), p. 395; and Arthur F. Burns, "Statement to Congress," *Federal Reserve Bulletin* (March, 1971), pp. 240, 242.

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95. "Recent Credit and Monetary Developments," *Federal Reserve Bulletin* (July, 1966), p. 951 and "Interest Rates in U. S. Capital Markets," *Federal Reserve Bulletin* (November, 1966), p. 1578.

96. "Interest Rates, Credit Flows, and Monetary Aggregates Since 1964," *Federal Reserve Bulletin* (June, 1971), p. 428.

97. "Summaries of the 1966 Outlook," *Banking* (January, 1966), p. 41. See also "Digest of the Business Outlook," (February, 1966) and (March, 1966 , pp. 30, 31; "Interest Rates, Credit Flows," p. 428; Burns, p. 240; and Martin, "Statement," (April, 1969), p. 326.

98. "Monetary Policy and the Residential Mortgage Market," *Federal Reserve Bulletin* (May, 1967), p. 729 and "Recent Capital Market," p. 395.

99. "Our Problem of Inflation," *Federal Reserve Bulletin* (June, 1969), pp. 501-2.

100. "Interest Rates, Credit Flows," p. 430.

101. Martin, "Statement" (April, 1969), p. 328.

102. "Recent Credit and Monetary Developments," *Federal Reserve Bulletin* (July, 1967), p. 1077.

103. *Ibid*, p. 1077.

104. See Chairman Martin's statements to Congress. *Federal Reserve Bulletin* (March, 1969), p. 235; (April, 1969), p. 378; and (July, 1969), p. 591.

105. Average annual interest rates paid on member bank time and savings deposits from 1964-1970 were: 3.47%, 3.73%, 4.11%, 4.32%, 4 56%, 4.65%, and 4.98%. See *Federal Reserve Bulletin*, Member Bank Income, selected issues, 1965 1971.

106. Lawrence S. Ritter, *Bank Liquidity Re-examined* (Chicago: Association of Reserve City Bankers, 1967), pp. 22-3. See also "Bank Credit," (February, 1966), p. 161; "Recent Bank Credit" (February, 1967,, p. 196, "Digest" (April, 1966), p. 37; Murray Olyphant, "Government Bonds," *Banking* (May, 1966), p. 8.

107. Paul S. Nadler, "Where Next for Regulation Q?" *Banking* (February, 1966), pp. 50, 128. See also Ritter, *Bank Liquidity Re-examined*, pp. 22 3, "Digest of the Business Outlook," *Banking* (April, 1966), p. 37; Ettin and Opper, p. 2, Bloch, p. 555; "Monetary Policy and the Residential Mortgage Market," p. 730; Martin, "Statement" (February, 1967), p. 213, and Mitchell, "Interest Rates Versus Interest Ceilings," pp. 269-70.

108. "Credit Availability Outlook," *Banking* (January, 1966), p. 34.

109. The possibility of this occurring, while always vaguely known, was emphasized recently by Cox in his comprehensive Regulation Q study. See Cox's *Regulation of Interest Rates on Bank Deposits*, Michigan Business Studies (Ann Arbor: University of Michigan, 1966), p. 150.

110. Ritter, *Bank Liquidity Re-examined*, p. 20.

111. Friedman, p. 16; and Robertson, "Statement" (August, 1966), p. 1143.

112. Arthur F. Burns, "Statement to Congress," *Federal Reserve Bulletin* (February, 1970), p. 125. See also "Announcements," *Federal Reserve Bulletin* (September, 1966), p. 1338; and Ettin and Opper, p. 3.

113. See "Survey of Time and Savings Deposits," *Federal Reserve Bulletin* (July, 1966), p. 956; Caroline H Cagle, "Changes in Time and Savings Deposits, December 1965--May 1966," *Federal Reserve Bulletin* (August, 1966), p. 1102; Martin, "Statement" (June, 1966), p. 801; and "Monetary Policy and the Residential Mortgage Market," p. 729 for a discussion of the lag and ineffective use made of fiscal policy during this time period, and the complications which resulted therefrom.

114. This Act broadened reserve requirement and Regulation Q powers, among others. See "Law Department," *Federal Reserve Bulletin* (October, 1966), p. 1451 and Robertson, "Statement," p. 1141.

115. "Announcements," p. 1338.

116. "Interest Rates in U. S.," p. 1582. The prime loan rate was at 5.75% for July and the first half of August, and at 6.00% thereafter; obviously, non-prime rates were even higher.

117. George Budzeika, *Lending to Business by New York City Banks in the 1950's and 1960's* (New York University. 1970).

118. "Interest Rates in U. S.," p. 1582.

119. Controversy abounds in the area of jawboning, both in regard to appropriateness (see Archie K. Davis, "Ten Basic Questions," *Banking* (June, 1966), p. 29) and effectiveness. Up until September, 1966, Chairman Martin had limited his use of this "tool" to the Congressional floor, see his "Statement to Congress," reprinted in *Federal Reserve Bulletin* (July, 1969).

120. "Announcements," p. 1338; Ritter, *Bank Liquidity Re-examined*, pp. 20-1; "Recent Bank Credit" (February, 1967), p. 190; and Martin, "Statement," (February, 1967).

121. "Interest Rates in U. S.," p. 1578.

122. Brill, p. 18.

123. "Interest Rates, Credit Flows," pp. 432-3.

124. "Interest Rates in U. S.," p. 1582.

125. "Interest Rates, Credit Flows," pp. 432-3; "Time and Savings Deposits," p. 1751; "Monetary Policy and the Residential Mortgage Market," p. 730; and "Interest Rates in U. S.," p. 1586.

126. The Interest Rate Control Act of 1966 broadened interest ceiling rates to cover insured savings and loan associations and mutual savings banks such that from the summer of 1966 onward, most of these financial institutions were regulated by rate maxima. All commercial banks have been subjected to such ceilings since 1936.

127. Donald D. Hester, "Financial Disintermediation and Policy," Journal of Money, Credit, and Banking (August, 1969), p. 611.

128. James Tobin, "Deposit Interest Ceilings as a Monetary Control," Journal of Money, Credit, and Banking (February, 1970), p. 10. See also Edward J. Kane, "Short-Changing the Small Saver: Federal Government Discrimination Against Small Savers During the Vietnam War," Journal of Money, Credit, and Banking (November, 1970), p. 516; Hester, p. 614; and Ettin and Opper, p. 11.

129. William M. Martin, "Statement to Congress," Federal Reserve Bulletin (October, 1969), p. 815.

130. Through powers embodied in the Interest Rate Control Act of 1966.

131. Brill, p. 18.

132. "Survey of Time and Savings Deposits," p. 956.

133. Martin, "Statement" (February, 1967), pp. 213-14.

134. "The Bank Deposit Outlook," Banking (April, 1966), p. 38. See also Milton Friedman, "Controls on Interest Rates Paid by Banks," Journal of Money, Credit, and Banking (February, 1970), p. 16; J. L. Robertson, "Statements to Congress," Federal Reserve Bulletin (June, 1966), p. 791; "Interest Rates in U. S.," pp. 1575-77; and Hester, p. 604.

135. "Recent Credit and Monetary Developments," Federal Reserve Bulletin (July, 1967), p. 1077; "Recent Capital Market Developments," Federal Reserve Bulletin (May, 1968), p. 397. See also "Financial Developments in the Third Quarter of 1969," Federal Reserve Bulletin (November, 1969), p. 869 and Friedman, "Controls on Interest Rates," p. 17.

136. "Financial Developments in the First Quarter of 1970," Federal Reserve Bulletin (May, 1970), p. 399; "Financial Developments in the Second Quarter of 1970," Federal Reserve Bulletin (August, 1970), p. 613; and Arthur Burns, "Statement to Congress," Federal Reserve Bulletin (March, 1971), p. 240.

CHAPTER III

CRITICISMS OF REGULATION Q

Introduction

Through the years, the volume of criticism directed at the Federal Reserve's interest rate ceiling authority has been growing. The growth in criticism has coincided with the use of Regulation Q as an instrument of monetary policy. The ceilings are now viewed almost exclusively as tools of restrictive monetary control, and their sister regulations have been spread to most of the nation's financial intermediaries (1).

Stabilization instruments used in a discretionary fashion are destined to draw a great deal of interest and discussion in a mixed market economy wherein the laws of demand and supply and free competition are tempered by the realities of socio-political objectives and the existence of less-than-competitive market structures. The questions of interference in a free-market economy and the appropriate role for discretionary governmental policy have been debated for some time. Recently one noted economist has suggested that

> public regulation may be justified in a free enterprise economy either because competition cannot be sustained where

> costs decline as the size of firms increases, or because goals other than economic efficiency are deemed more important. In appraising the present regulatory framework, two important questions must be answered. First, are the objectives underlying these regulations desirable? Second, if these objectives are desirable, are the present regulations necessary to bring them about? (2).

Regulation Q is a discretionary monetary tool and hence is one of the regulations bound to be under scrutiny. Although there is almost universal acceptance of the idea that banking needs to be regulated for the safety of the depositor and the benefit of stability in the economy, many critics of this particular regulation insist that interest ceilings are an unnecessary part of a sound banking system. They suggest that the Federal Reserve System, in changing the use of Regulation Q, might not have realized the full implications of a restrictive set of ceilings (3) or perhaps that the Fed attributes considerably more beneficial results to Regulation Q ceilings than in fact is appropriate (4).

Very few economists take a neutral stand when assessing the effects of Regulation Q and discussing its possible future. Several blue-ribbon committees have suggested that Regulation Q either be placed on a stand-by basis, abolished, or extended to cover all financial institutions (5). The Advisory Committee on Banking appointed by the Comptroller of the Currency, reported in 1962 that

> regulation of interest rates on time and savings deposits is in conflict with the principle that money rates and bond yields should be permitted to fluctuate in response to changing market conditions and that commercial banks should be free to adjust rates (paid and charged) to those conditions. Whatever function this type of regulation may serve to discourage banks from taking undue risks can be achieved more directly and properly, and with less adverse impact upon the competitive power of member banks, through the supervisory function.... (The Committee) therefore recommends that the present authority to regulate interest rates on time and savings deposits be put on a standby basis (6).

More recently, a Presidential committee has been appointed to review the existing regulatory framework of all financial institutions in the country. Several distinguished economists were asked to make suggestions to the Committee regarding its appropriate focus and scope of topics, and unsurprisingly, Regulation Q was brought up as one of those subjects.

Professor Wallich, one of the economists charged with drawing up guideposts for the President's commission, maintained that Regulation Q was not one of those "uncontrollable factors" that interfered with the Fed's monetary policy maneuvers in recent years and remarked that since the Board

> did not abolish or move it (Regulation Q) out of reach, but instead caused ceilings including for thrift institutions, to proliferate, one is bound to wonder about either the rationality of government or else, and more likely, about the feasibility of living without Regulation Q (7).

Interest rate controls on time and savings deposits have proven to be unpopular in many segments of the economic community. They have been attacked by the theoriticians as undesirable price controls, by the majority of economists as detrimental to the stable growth of commercial bank time deposits when frozen, and by small bank managers and other economists as tools of discrimination and destruction when continually raised. Thus, some students of Regulation Q object to the ceilings per se, some object when they are not raised or are lowered, and still others object to the ceilings as they are lifted--no one consistently hails Regulation Q as a boom to stabilization policy. Because the focus of our study is the restrictive setting of these ceilings and the implications this action has for commercial bank portfolios, we will concentrate our discussion of Regulation Q criticisms in this area.

Regulation Q Ceilings Based on Inadequate Knowledge

One criticism of the Fed's use of Regulation Q is that the Board and its staff have failed to develop an adequate understanding of the processes connecting policy actions and bank reserves, the money supply, and aggregate demand, and in this failure, cannot hope to determine the true effect of changes in Q ceilings on these variables (8).

Critics extend this argument to claim that changes in Regulation Q may be more harmful than helpful in regulating bank credit if they are ill-timed or have undesirable and unpredictable "announcement" effects. Under such conditions, critics suggest that the Board postpone the use of Regulation Q ceilings as a monetary tool until its knowledge of economic processes matches its monetary power.

The weight of this criticism can only be minimized if the Fed possesses much greater knowledge of the effects of Regulation Q than they have presented to the general public. In personal correspondence with Caroline Cagle, the Board's resident time deposit expert and author of periodical time deposit analyses in the Federal Reserve Bulletin, we received confirmation of the scarcity of continuous and disaggregated time deposit series corresponding to the breakdowns under Regulation Q (9). It was not until April, 1970 that the Fed started requiring time deposit maturity breakdowns from member banks (10) and yet for years the Board has set Q ceilings based on maturity. This would seem to indicate a serious deficiency of feedback information normally considered essential for continuing policy decisions.

Regulation Q's Effect on Competition

While there are many factors to take into consideration in determining flows of savings in the economy, among the important ones is the interest rate paid on one financial claim versus that paid on competing financial claims. Accordingly, critics maintain that restrictive levels of interest rate ceilings seriously hamper free competition for funds among financial institutions and hamper affected intermediaries in their attraction of open market funds (11).

Furthermore, restrictive Regulation Q ceilings allow for a subsidy of rates paid by nonbank users of financial resources. Relatively low levels of these ceilings tend to lower the general level of interest rates in the economy below what they would be if commercial banks--large bidders for funds--were permitted to register their fund demands in the financial marketplace. A subsidy of interest rates below free market rates thus accrues to borrowers of funds as Q ceilings are set at restrictive levels.

This anti-competitive effect of controls like Regulation Q can have serious consequences for the structure of financial markets. Lawrence Ritter argues that

> the detailed network of regulation governing the sources and uses of funds by financial institutions appears to be based on the assumption that the only way, the one way to prevent the undesirable consequences of bank failure is by prohibition. By limiting risk-taking, curbing flexibility, and inhibiting competition in financial markets, we are evidently trying to make it practically impossible for any financial institution to close its doors. If no financial institution ever fails, there can be no undesirable consequences. However, insofar as social values are served by risk taking, freedom to innovate, flexibility, and competition in financial markets, the proper social policy for financial institutions is insulation, not prohibition. What we should do is permit the activity to take place, and at the same time, see to it that such undesirable consequences as may occur are contained to negligible proportions (12).

The Board of Governors appear to be torn between the advantages of free competition among financial institutions--the more "efficient functioning of our financial markets, (the) improved allocation of resources, (and) the fostering of innovations in financial technology" (13)--and the advantages of having an additional monetary tool. A number of the Board members do not favor these deposit rate ceilings because of their anti-competitive consequences, and in 1966, secured Congressional permission to suspend various Regulation Q ceilings whenever feasible (14).

Regulation Q and Liquidity Crises

During periods of inflation and strong demands for funds, especially when the brunt of stabilization policy falls on the shoulders of the Federal Reserve, depository institutions tend to lose funds to the open market. Critics assert that the failure to raise Regulation Q ceilings can bring this tendency to a sudden surge and can result in liquidity crises for individual banks and perhaps for the entire banking system if the ceilings cause funds to move out of these institutions into the open market rapidly or in large quantity (15).

Commercial banks are not unaware of this possibility in managing their portfolios, but apparently assumed that interest rate ceilings would be raised whenever they became effective hindrances to the further attraction of time deposits. From 1956 through 1965, the Fed did indeed raise various Regulation Q rates (see Tables II-3, II-5, & II-11 or Appendix Table 2) as competing interest yields slowly crept upward and as banks "sought to have the ceilings set by Regulation Q lifted or removed (16)." While banks remained concerned that even "these new ceilings would not prove to be high enough to prevent large-scale deposit losses," (17), they had come to expect continual adjustments in the ceilings.

The Board of Governors had issued warnings to banks of the hazards involved in relying excessively on short-term time deposit money, admonishing banks which had "lumpy" concentrations of CD's or a rather high percentage of deposits in the more volatile types of time deposits (18). The monetary authorities, however, never warned that they would put a rigid lid on the level of the ceilings at the same time other monetary tools were working to push market interest rates upward. The unexpectedness or unpredictability of this type of central bank policy is what makes Regulation Q so serious and volatile a problem for commercial banks in this country.

It has been suggested that not only are banks subject to unexpected and arbitrary changes (or the lack of same) in the administration of Regulation Q ceilings, but that recently the bank manager's job has been complicated by increasing levels of saver sophistication. Prompted by high absolute levels of interest rates and by widening spreads between bank rates of return and those on competing market instruments (19), savers have supposedly become much more interest-sensitive. Further, critics of Regulation Q claim that this seems to be a well-learned lesson: even though interest rates fell at times during the 1966-1970 period, many funds held in commercial banks seemed to respond to interest rate spreads identically as they had in the high interest rate years, apparently signalling a permanent change in saver sensitivity and hence an increase in the volatility of bank time deposits. The combination of high levels of interest rate sensitivity among holders of bank time deposits and a restrictive usage of Q ceiling is claimed to invite commercial bank instability.

If Regulation Q can cause liquidity crises for single banks or for a substantial group of these firms, critics maintain that it is possible for Regulation Q to force a liquidation of bank assets at an undesirable pace as banks rush to cover time deposit withdrawals (20). Early in 1966, it was suggested that

> a sudden withdrawal of funds from the CD market would force many banks into sweeping portfolio adjustments, and under present conditions might create chaotic conditions in the money and capital markets. Assets liquidated by banks would not necessarily be those sought by corporate funds seeking alternatives to CD's. The result might be sharp discontinuities in the supply of funds available to some sectors of the economy. State and local governments, small business borrowers, and home builders and buyers might well be the principal sufferers (21).

The Fed was truly in a dilemma: if it raised Q ceilings, banks were surely going to expand credit at a pace which the Fed had determined was undesirable; if it did not raise Q ceilings, banks might be forced to liquidate assets at a pace which also was undesirable in that it disrupted financial markets. The Board chose the latter course of action and it is part of our work here to assess the effects of this alternative.

Regulation Q and the Housing Market

The final important criticisms directed at the restrictive use of Regulation Q involve the housing industry. Because of housing expenditures' dependence on borrowed funds, because interest costs constitute such a large percentage of the total cost of the purchase price of a house, and because of the postponable nature of housing expenditures, the housing industry is extremely sensitive to cyclical changes in monetary policy and the level of interest rates (22). The protection of mortgage lending institutions against costly interest rate competition through the fixing of maximum commercial bank time deposit rates is one suggested means of aiding this important but vulnerable sector of the economy during economic expansions (23).

This use of Regulation Q, however, has been attacked as an inefficient subsidy to housing and an inequitable tax on commercial bank lending powers (24). Critics suggest that direct subsidization of given sectors of the economy is a more desirable method of reallocating funds in that it does not entail purely arbitrary, unknown, or unmeasurable taxes and subsidies which are inherent in price ceilings (25).

Some critics suggest that the social benefits supposedly generated by the restrictive use of Regulation Q are, in reality, nonexistent. One study has found evidence to indicate that increased amounts of funds available to the mortgage industry are not going to lower middle and low-income families but are ending up in the upper middle and high-income groups (26). If this finding is sustained, we would be forced to conclude that the "whole system of mortgage subsidization and deposit-rate ceilings imposes a regressive tax on interest income and a perverse subsidy on interest expense," (27) and that Regulation Q, when used restrictively at commercial banks, does not benefit that segment of the economy which it is supposed to benefit - lower-income mortgage borrowers.

Finally this use of Q as an aid to housing is doomed to failure if commercial bank funds do not go into mortgage-lending institutions but move instead into the open market (28). It is suggested that this was the effect after 1966 when most of the important mortgage lending institutions were subject to interest rate ceilings.

Summary

One criticism of the setting of Regulation Q ceilings at disequilibrium levels during periods of rapid economic growth centers around the tendency for this action to put commercial banks at a competitive disadvantage in the financial marketplace. Banks desiring to raise rates paid on time deposits are denied from doing so while other parts of the economic system not subject to the ceilings are allowed to continue to attract funds via interest rate increases.

A second frequently mentioned flaw in the restrictive use of Regulation Q is the Board's lack of continuous and complete information on the effects of monetary policy maneuvers in general and the effects of a change in the level of Q ceilings in particular. Critics maintain that until the Federal Reserve has a more sophisticated and accurate feedback system, it should refrain from frequent use of this tool so as to avoid possible unanticipated and undesirable shifts of funds; which leads us to the next front attack.

It is suggested that while commercial bankers do prepare for discontinuities in time deposit growth when planning their portfolio policies and in setting up their liquidity reserve, bankers are ill-equipped to predict the Board's setting of these ceilings. As a result, it is suggested that bankers may at times face runoffs of time deposits due to Regulation Q for which they are unprepared Such losses, if sufficiently large enough or concentrated in a sufficiently short time period, might precipitate a liquidity crisis in the banking system.

Opponents of a restrictive usage of Regulation Q are apprehensive about the ability of banks to meet serious time deposit withdrawals through routine sources of liquidity, and suggest that banks may be forced into selling some of their reasonably long-term assets at considerable discounts. Such conditions are not conducive to stable financial markets and suggest an inefficient utilization of bank funds (29). Critics of time deposit interest rate ceilings conclude that the Fed's goal of financial stability is poorly served by the restrictive administration of Regulation Q (30).

Finally, prior to 1967 the Fed was criticized for attempting to use restrictive levels of Q ceilings to aid thrift institutions and the mortgage market on the basis that this aid was unsure and inefficient at best and possibly not effective in any event. The broadening of interest rate ceilings to other financial intermediaries after 1966 while eliminating the housing criticism, was seen as a spreading of the other problems created by Regulation Q to larger numbers of financial institutions (31).

The next chapter reviews the literature surrounding the liquidity crisis criticism--our interest here--by focusing on the areas of time deposit determinants and substitutes, liquidity standards of banks, and bank portfolio policy.

NOTES

1. James Tobin, "Deposit Interest Ceilings as a Monetary Control," *Journal of Money, Credit, and Banking* (February, 1970), p. 4.

2. Donald Jacobs, "The Framework of Commercial Bank Regulation: An Appraisal," *National Banking Review* (March, 1964), p. 57.

3. Maurice Mann, "How Does Monetary Policy Affect the Economy?" *Federal Reserve Bulletin* (October, 1968), p. 808.

4. Milton Friedman, "Controls on Interest Rates Paid by Banks," *Journal of Money, Credit, and Banking* (February, 1970), p. 17.

5. See *Money and Credit*, Report of the Commission on Money and Credit (Prentice Hall: 1961), pp. 167-8; *National Banks and the Future*, Report of the Advisory Committee on Banking, Comptroller of the Currency (Washington: 1962), pp. 115-27; and *Report of the Committee on Financial Institutions*, Office of the President (Washington: 1963), pp. 19-24.

6. "National Banks and the Future," *Banking* (October, 1962), p. 120.

7. Henry C. Wallich, "One Chance in a Generation: Guideposts for the Commission on Financial Structure and Regulation," *Journal of Money, Credit, and Banking* (February, 1971), p. 28.

8. Karl Brunner and Allan H. Meltzer, "The Fed's Approach to Policy," *Banking* (March, 1964), p. 50; and Friedman, p. 27.

9. Caroline H. Cagle, personal communication, August 24, 1971.

10. See Caroline H. Cagle, "Changes in Time and Savings Deposits, January--April 1970," *Federal Reserve Bulletin* (September, 1967).

11. Almarin Phillips, "Structural and Regulatory Reform for Commercial Banking," *Issues in Banking and Monetary*

Analysis, edited by Giulio Pontecorvo, Robert P. Shay, and Albert G. Hart (New York: Holt, Rinehart, and Winston, Inc., 1967), p. 8, Almarin Phillips, "Competition, Confusion, and Commercial Banking," *Journal of Finance* (March, 1964) reprinted in Paul F. Jessup, *Innovations in Bank Management, Selected Readings* (New York: Holt, Rinehart, and Winston, Inc., 1969), p. 394, American Bankers Association, *The Commercial Banking Industry* (Englewood Cliffs: Prentice-Hall, 1962), pp. 82, 85, 86 Jules I. Bogen and Paul S. Nadler, *The Competitive Position of Commercial Banks* (Chicago: Association of Reserve City Bankers, 1959), p. 32; Jules I. Bogen and Herman E. Krooss, *Savings and Other Time Deposits in Commercial Banks* (Chicago: Association of Reserve City Bankers, 1962), p. 28; and Jules I. Bogen, *The Changing Composition of Bank Assets* (Chicago: Association of Reserve City Bankers, 1961), p. II.

12. Lawrence S. Ritter, "Commentary," in Pontecorvo, p. 74.

13. William M. Martin, Jr., "Statement to Congress," *Federal Reserve Bulletin* (June, 1966), p. 802.

14. Arthur F. Burns, "Statement to Congress," *Federal Reserve Bulletin* (April, 1971), p. 303.

15. G. Walter Woodworth, "Theories of Cyclical Liquidity Management of Commercial Banks," *National Banking Review* (June, 1967), p. 383; Jerry Wayne Lee, *Changing Liquidity Patterns in the American Banking System* (University of Florida: 1969), pp. 89-91; Clifton H. Kreps, Jr., "Improving the Competition for Funds," *Banking* (January, 1964), p. 55; Lawrence S. Ritter, *Regulation Q: Issues and Alternatives* (Chicago: Association of Reserve City Bankers, 1965), pp. 31-32; and Wallich, p. 28.

16. Richard Fieldhouse, *Certificates of Deposit* (Boston: Bankers Publishing Company, 1962), p. 46.

17. *Ibid*, 46.

18. William M. Martin, Jr., "Statement to Congress," *Federal Reserve Bulletin* (March, 1965), p. 409.

19. American Bankers Association, *The Problems of Commercial Bank Liquidity* (New York: 1957), p. 39.

20. Sherman J. Maisel, "Statement to Congress," *Federal Reserve Bulletin* (June, 1966), p. 800.

21. Martin (June, 1966), p. 803.

22. William M. Martin, Jr., "Statement to Congress," *Federal Reserve Bulletin* (October, 1969), p. 821.

23. Martin (June, 1966), p. 802.

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CHAPTER IV

REVIEW OF THE LITERATURE

Introduction

Our study is concerned with bank competition for loanable funds and how this competition may be affected by the levels of Regulation Q ceilings. It assumes that bank time liabilities are substitutable for a number of similar intermediary claims or for certain open market instruments in savers' portfolios. The presence of substitutability among various financial claims seems so familiar and logical to us as economists that we sometimes forget how recent is the interest in this area.

The importance of financial substitutability was restated by J. G. Gurley and E. S. Shaw in the mid-1950's with their bold conclusion that banks were only "one among many financial intermediaries, sharing with (them) the functions of indirect finance," and that because of the similarity of these institutions and the claims they issued, there tended to be a great deal of substitutability among these claims (1). We have covered a great expanse of economics since the Gurley-Shaw Hypothesis was first presented, but their work lies at the heart of our study here.

The remainder of this chapter will review the important work which has been done in the last two decades that bears on commercial bank competition for funds. It also surveys the area of factors important in the growth of bank time deposits, touches on the subject of bank liquidity standards, and concludes with a review of the material pertaining to bank portfolio policy. Together these areas serve as a prelude to our own empirical research.

Determinants of Commercial Bank Time Deposits

The question of what sorts of phenomena affect the demand for commercial bank time deposits (2) has been in the forefront of financial research for a number of years. A whole host of determining factors have been suggested as being important in this demand, including (3):

1. The level of and changes in GNP, personal income and wealth.
2. The level of personal savings, business savings, and of short-term financial capital.
3. Corporate profits and taxes.
4. The number of commercial banks versus the number of savings and loan institutions, mutual savings banks, and credit unions.
5. Bank advertising expenditures and promotional efforts versus similar expenditures at competing thrift institutions.
6. The convenience and location advantages of banks over other financial intermediaries.
7. Other financial services rendered at banks.
8. The safety of the banking system versus other financial intermediaries.

9. The liquidity features of bank time deposits.
10. The absolute level of interest rates paid on time deposits.
11. The yield differential between bank and non-bank financial claims.
12. The expected amount of price inflation or deflation in the future.
13. The number of different types of deposits available at banks versus other financial institutions, the "tailor-madeness" of a financial claim.

Most of these factors have been empirically linked to the growth of bank time deposits (4). One of the more recent studies concludes:

> although the findings presented here, like most findings about demands for financial assets, are necessarily tentative, they are highly suggestive They indicate that barring the years 1930-33, which led up to and included the banking panic of 1933, and 1942-45, the years of World War II, movements in aggregate holdings of savings deposits can be explained reasonably well by a few key variables population, prices, a proxy for per capita real wealth, yields on savings deposits, yields on market securities, and the institution of Federal deposit and share insurance. And they suggest that the influence on yields is substantial (5).

While each of these factors plays some role in the public's portfolio decision process, our interest here is centered upon the effect of rates of return on these instruments and so we will primarily survey the literature which is pertinent to this topic.

Yield Differentials

While one of the most commonly expressed economic forces behind the growth of bank time deposits is the rate of return on these claims, more exactly it is the relative rate of return or the yield differential between the time deposit rate paid and a competing instrument's yield. If time liabilities at commercial banks compete with other instruments and if savers choose among these competing claims on the basis of the interest yield, it seems only logical that savers must look at differences in these yields as they make their portfolio decisions.

Further, bank time deposits are not a homogeneous class of claims. There exist a number of different types of bank "time deposits," and it is believed that these different types substitute for or compete with different types of nonbank financial claims. We must then be careful as we discuss yield differentials. Certain time and savings deposits at commercial banks are believed to compete with thrift institution funds, and here bank time deposits tend to have lower rates of return than nonbank financial intermediary claims. Other commercial bank time deposits compete with claims in the open market and here bank deposits tend to have higher rates of return than competing securities.* These distinctions will be important to us as we discuss the interest sensitivity of bank time liabilities.

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*See any of Cagle's articles analyzing these difference.

Interest Sensitivity

The question of time deposit interest rate sensitivity is a controversial one. On one hand, economists claim that interest differentials are a very important determinant of the level of time deposits in commercial banks and that adverse yield spreads are quite sufficient to cause time funds to flow out of commercial banks (6); that low levels or Regulation Q ceilings relative to competing interest rates will prohibit commercial banks from paying higher time deposit rates (7); and that consequently restrictive Regulation Q ceilings can cause commercial banks to lose various types of time deposits (8). On the other hand, much of time deposit rate sensitivity is flatly denied (9).

This controversy ought to be verifiable through analysis of actual financial behavior. Indeed, numerous studies have been done on the interest sensitivity of particular types of bank time deposits, uncovering phenomena like the tendency for time deposits to be more interest-sensitive than savings deposits (10); the tendency for large depositors to be more interest sensitive than small savers (11); the tendency for foreign deposits to be more rate-sensitive than domestic deposits (12); the tendency for money market center deposits to move more readily than deposits located elsewhere in the country (13); the tendency for small banks to issue substantially smaller volumes of negotiable time certificates of deposit than large banks (especially those large banks in

New York City and in Chicago) (14); the tendency for large banks to raise interest rates paid on time deposits more than small banks when permitted under Regulation Q ceilings (15); the tendency for growth rates of time deposits to be higher at large than at small banks (16); the tendency for negotiable time certificates of deposit to be the most interest sensitive of all categories of bank time liabilities (17), and the tendency for large-denomination, short-term prime CD s to require a 1/4 percent premium over comparable U. S. Treasury Bill rates in order to remain competitive (18). Federal Reserve sponsored research has concurred with many of these findings (19).

The Evidence

Several research efforts have attempted to empirically measure the determinants of time deposit growth and the degree of interest sensitivity of one type or all types of bank time liabilities. One of the first studies, the 1957 Alhadeffs work, found little indication of interest sensitivity of bank time deposits (20). The notable work of Edgar L. Feige also found very low elasticities or substitution and even complementary relationships among time deposits and nonbank financial intermediary claims (21). A 1962 study by Davis and Guttentag produced results similar to those of the Alhadeffs, concluding that "there is little evidence that cyclical swings in interest bearing deposits at commercial banks have been much affected by the relative attractiveness of savings at mutual savings banks and at savings and loan associations" (22).

These were some of the earliest projects undertaken in this area, however, and later studies tended to suggest that these were largely temporal findings. Indeed, it appears that there was a distinct shift in savers' responses to interest yields during the 1960's (23), and post-1961 studies tend to reflect these changes. Edgar Feige, in his 1964 study, generated the following time deposit demand equation (24):

$$T = \underset{(.037)}{.122(Y)} - \underset{(37)}{101(r_d)} + \underset{(10)}{76(r_t)} - \underset{(10)}{44\ r_s}, - \underset{(11)}{82(r_m)}$$

where r_d = (negative) interest rate on demand deposits,
r_t = average effective interest rate on time deposits,
r_s = average effective interest rate on savings and loan shares,
r_m = average effective interest rate on mutual savings bank deposits,

indicating that time deposits are positively related to GNP, positively related to the spread between the time and demand deposit rate, positively related to the time deposit rate itself, negatively related to savings and loan share rates, and negatively related to rates paid on mutual savings deposits. We thus find clear evidence of time deposit interest rate sensitivity in this work.

A 1965 study by Albert Cox was another attempt to measure the interest sensitivity of time deposits at banks, and this study directly linked levels of Regulation Q ceilings to the growth of commercial bank time liabilities. Cox found that while Regulation Q was not effective in stopping commercial banks from raising savings deposit rates during the period from 1933-50, it began to have this effect from 1950-56. The restrictive effect increased during the period 1957-61 and apparently grew quite strong from 1962 onward (25). He concluded that the growth of bank certificates of deposit had been adversely affected almost continuously throughout the 1951-65 period except for the recession years of 1954, 1958, and 1961 (26).

The Gramley and Chase study, published in 1965, found significant influences on bank time deposit growth from both the Treasury Bill rate (negative) and the time deposit rate (positive), and found a slight sensitivity to levels of personal income for the period 1948-57 (27). The study uncovered an even more pronounced interest rate correlation (and almost no income effect) after 1957 (28).

A more recent study, conducted by DeLeeuw and Gramlich, estimated the demand and supply time deposit functions, generating the following demand relationship (29):

$$\frac{TD}{Y} = .01386 + .00941(R_{TD}) - .00158(R_{TB}) - .00348(R_C)$$

$$+ .8953\left(\frac{TD}{Y}\right)_{-1} - .1477\left(\frac{Y}{Y_{-1}}\right)$$

where R_{TD} = annual average rate on time and savings deposits,

R_{TB} = three month U. S. Treasury Bill rate,

R_C = Moody's Aaa seasoned corporate bond rate,

TD = annual average volume of time and savings deposits at commercial banks, and

Y = Gross National Product.

The DeLeeuw and Gramlich equation then also indicates that time deposit growth rates depend heavily upon their own and alternative rates of return. Predictions which were made with this equation were highly accurate [30].

A further study conducted by Chase in 1969 tends to support these conclusions. He states clearly in his summary that

> the yield variables are highly significant, which suggests that the real size of the intermediary sector depends importantly on the yield offered to savings depositors relative to market yields.... The apparent sensitivity of savings deposit holdings to yields on savings deposits and market yields implies what we would expect--that policies which hold down rates offered by intermediaries may have substantial effects on the real level of intermediation [31].

The recent study of Patric Hendershott suggests that bank time deposits do tend to be interest sensitive. In his model, Hendershott introduces the notion that Regulation Q is in fact capable of effectively inhibiting commercial banks from increasing their time deposit rates and he therefore specifies this effect through the use of a constraining variable in the time deposit supply equation [32]. The simulation equations he generates in the model indicate that changes in the average level of Regulation Q ceilings have had quite a large effect on bank time deposit rates of interest, but that this effect is lagged over several periods (33).

Hendershott's study also estimated the demand for commercial bank time deposits during the period 1950-66, first using an equation for the whole sixteen years and then splitting the period into 1950-57 and 1958-66 subperiods via a dummy variable. He discovered rather significant differences in savers' interest sensitivity before and after the year 1957 (34). He estimated changes in time liabilities from the beginning of 1966 to the middle of 1967, claiming "moderate success" in these predictions (35).

Summary

The weight of the research reviewed here indicates that bank time deposits are affected by levels of national income, levels of saving, by relative interest rates, and by Regulation Q rates, and that the degree of time deposit interest rate sensitivity has seemed to increase over time. We found no recent research which supports the view that bank time liabilities are rate insensitive or that they will not respond to changes in Regulation Q ceilings nor, however, have we found any studies surveying the period after 1968. Empirical work on the financial sector of our economy, while hampered by problems of measurement, statistics, and data collection, needs to continue if we are to find an answer to the question of time deposit rate sensitivity.

Liquidity Standards of Commercial Banks

Until the 1960's, it was common practice to accuse commercial banks of being preoccupied with liquidity considerations, of ignoring or rejecting the more profitable yet sound investment opportunity in the community, and hence, of not serving the public interest fully (36). And while there is little doubt that we can still find rather high liquidity ratios in some areas of the nation's banking system (especially among the ranks of the smaller firms), the banking business has been under great pressure recently to change its traditional views of adequate liquidity. A reawakened spirit of competitiveness and increasingly attractive investments have worked together to deaden banks' liquidity preoccupation.

Indeed, liquidity can never be a matter of indifference to these financial institutions. One author explains that

> all business firms, and households and governmental units as well, have liquidity problems which must be taken into consideration to a greater or lesser extent from time to time. The need to raise cash quickly, and to do so without taking capital losses in the process, arises on various occasions in the course of events for almost every economic unit. But for most economic units the need for liquidity is not so pervasive as it is in commercial banking, where liquidity considerations invariably impinge on practically all decisions almost all of the time. This is inherent in the very nature of commercial banking, which consists essentially of selling one's own liabilities, mostly short-term and many payable on demand, and using the funds to purchase the liabilities

> of others, many of which are intermediate- and long-term (37).

The importance of liquidity to commercial banks can be seen by examining the broad range of functions served by bank liquidity: (a) the meeting of reasonably predictable seasonal, cyclical, or secular losses of deposits (38); (b) the meeting of reasonably predictable increases in loan demand (39); (c) the buffering of the loan portfolio from forced cutbacks (40); and (d) the protection of the bank's capital from losses on the forced sale of securities (41).

In this section we review the subject of bank liquidity ratios, needs, and sources, especially as they are related to the loss of deposits. Unfortunately, the bulk of literature in these areas was singularly nonrigorous and descriptive. Much of the published material on bank liquidity behavior could be substantially strengthened by empirical research along the lines we set out in our own quantitative model (see Chapter V and VI). We present in the next few pages the views of the literature as it stands.

Liquidity Ratios and Standards

Within a reasonable range, commercial banks must be able to assess their liquidity needs and liquidity preparedness throughout the whole continuum from very short-term to rather long-term time periods. Liquidity needs and preparedness are concepts meaningful only in a relative sense however. To measure levels of adequate and required liquidity, the banking industry has developed a number of liquidity ratios which relate liquid resources directly to various measures of the potential need for them. Among these liquidity ratios are: the volume of short-term government securities to demand deposits (42), the volume of government securities to total assets (43), the total investment portfolio to total assets (44), the volume of short-term U.S. Government securities to total deposits, and the loan-to-deposit ratio. The last two are the most commonly used in the industry, although the latter is actually a measure of illiquidity (45).

There are several important characteristics of these various ratios which are of interest to us here. For one thing, the liquid asset to total asset ratio for the industry and for individual banks has declined almost continuously since World War II. Because the Federal Reserve had agreed to minimize the cost of funding the War via its support of the U.S. Government securities market, it was obliged to expand the money supply at rapid rates during the War with the result that both the private spending sector and the commercial banking system found themselves in an extremely liquid position in 1946. Thereafter bank liquidity ratios slowly declined as the system began a return to normalcy (46). Even after regaining their pre-War levels, traditional liquid asset to total asset ratios continued to decline, reflecting: (a) the more profitable use to which funds could be put as loan rates slowly crept upward; (b) banks attempt to keep more fully invested as sources of bank funds became more costly; (c) the advent of liability management; and (d) the ability of banks to pare excess liquidity through almost instantaneous information provided by the computer (47).

This secular decline in bank liquidity standards is not meant to imply that the only discernible movement in bank liquidity ratios was downward. Cyclical movements in liquid asset holdings of a rather complex nature are also part of the post-War history of bank liquidity management (wherein commercial banks adjust their liquidity position to reflect varying demands for funds and the stages of the business cycle) (48). These movements are intricately related to the total bank portfolio approach--the subject of the final part of this chapter.

Another important characteristic of bank liquidity ratios is that while they tend to change both secularly and cyclically over time, at any point in time they are rather staunchly defended against major change (49). Moreover, most banks are not inclined to breach certain minimum standards at all. One source explains that

> almost all banks have unofficial loan limits beyond which they are reluctant to lend.... Almost any bank which has reached this limit is faced with the problem of cutting down on new loan extensions.... (While) it is true that minimum liquidity standards are somewhat flexible, under pressure of insistent loan demands, these standards tend to be scaled downward.

> Nevertheless, every bank has some minimum liquidity ratio below which it cannot safely drop (50).

Bank managers thus define minimum short-term asset to total deposit or maximum loan to deposit ratios which they will maintain until it is certain that one or more of the basic liquidity-determining factors have systematically shifted, although the pressure from valued customers to violate these limits may, at times, be quite intense (51).

Lastly, it is known that commercial bank liquidity ratios are nothing more than a general guide to the true state of liquidity of the individual institution or of the system as a whole (52). Unfortunately, these ratios give a deficient, vague, and oversimplified picture of bank liquidity. They can do no more than roughly approximate either cash needs or cash available because as simple ratios they do not take into account the nature of the quantities they are comparing, the characteristics of bank assets and liabilities, or changes in liquidity management techniques. This means that each bank in the system must determine its own liquidity needs and resources, and further that we must view bank liquidity ratios with a cautious eye.

Determinants of Liquidity Needs

Simple ratios of liquid asset holdings to total assets or to total deposits do not adequately measure either liquidity provisions or liquidity needs because they fail to take into account the following types of factors: the average maturity of assets, the risk level of asset originators, the proportion of liquid assets pledged to other purposes, and the size of the capital reserve (53).

In spite of these reservations about simple bank liquidity ratios, the more commonly used ratios do tend to measure the most important determinants of liquidity needs--the size of the loan and deposit portfolios. At least one study of bank loan and investment policies concluded that bankers look only at changes in these magnitudes in considering their liquidity needs and provisions (54). Respondents in the study claimed to have estimated future loan liquidity needs by consulting with the bank's present customers regarding their current and anticipated loan plans, or by drawing up statistical estimates of loan demand based on predictions of national income and the bank's traditional share of that income in loans (55). They utilized a similar forecasting approach to estimate expected minimum levels of deposits for the bank, and then combined the resulting maximum loan and minimum deposit forecasts to give a measure of liquidity needs for the future (56).

At the heart of this measuring and forecasting process at banks is the specter of deposit losses (in cash or through an adverse check clearing balance) whether the losses result from exogenous shifts in the public portfolio preference for cash or from unanticipated drains associated with the extension of loans. Some indication of the volatility of the deposit portfolio, a measure of potential deposit losses, can be gained by looking at the composition and ownership distribution of total bank deposits (57).

In general, time and savings deposits tend to be much less volatile than demand deposits, such that as time deposits increase relative to demand liabilities, commercial banks can probably safely cut down on their provisions for liquidity and vice versa. Estimations of annual time deposit turnover range from .40 (58) to 1.00 (59), while annual demand deposit turnover rates (for banks outside New York City) of 30 to 40 times annually are not unusual (60). This is quite a large difference in turnover rates of various types of deposits, and most banks have tended to adjust their liquidity position in accordance with changing levels of time versus demand deposits.

The Federal Reserve Bank of New York's guidelines for liquidity reserves explicitly take deposit volatility into account by suggesting a breakdown of deposits not on a demand-time-savings basis, but by breaking down bank liabilities into volatile, vulnerable, and residual deposit categories (61). This approach is more rigorous and exacting in that it estimates potential liquidity needs for the bank from actual deposit characteristics and is followed by many member banks. We turn now to a discussion of liquidity resources available to meet reserve losses.

Sources of Liquidity

A recent study of bank liquidity reviewed the evolution of liquidity management theories, stressing the point that commercial bank liquidity can come from many different sources [(62)]. The four theories which have guided bankers over the years are: the commercial loan theory wherein liquidity comes from self-liquidating loans (the anticipated income theory wherein liquidity comes from the repayment of loans, the recent liability management theory wherein liquidity could be obtained through the solicitation or attraction of more liabilities), and the shiftability theory wherein liquidity comes from the holding of liquid investments. Long ago most bankers abandoned the commercial loan theory as a viable description of the banking business and we will therefore concentrate on the other three theories. In relation to our interest in Regulation Q and liquidity crises, we will be examining each of these theories with regard to their explanation of liquidity available to meet deposit losses.

Anticipated income theory.--The anticipated income theory suggests that the loan portfolio provides liquidity for the commercial bank as funds flow into the institution from the repayment of loans. It must be recognized however that the amount of available liquidity depends importantly upon the amortization practices of the individual institution. The loan portfolio in the modern bank only releases funds for liquidity purposes during periods of overall declining loan demands (or at other points in small amounts) (63). In general, liquidity from this source is considered unreliable and in any event, unimportant for meeting deposit withdrawals.

Liability management theory.--A second major liquidity theory is that centering upon the management of liabilities as a source of liquid bank funds. Here the source of liquidity for the commercial bank is borrowing, on the assumption that the ability to borrow increases one's liquidity capacity just as surely as does the actual holding of liquid assets (64). While additional amounts of liquidity are usually needed during tight money periods, times when potential borrowing avenues are likely to be severely restricted or even closed to banks, some borrowing avenues are still available to these institutions.

One of these borrowing sources is the Federal Reserve discount window (65). The administration of Fed discount policy has created a great deal of controversy at times, but funds are usually available to member banks (either through discounting or through obtaining advances on certain assets) so long as the bank meets minimal reserve and lending standards. Especially in times of large or unexpected cash drains from the system, Federal Reserve lending would serve to enlarge the liquidity pool of commercial banks.

A second borrowing source under this theory is the Federal funds market wherein banks in need of reserves borrow from banks which have excess reserves (66). A great many banks in this country hesitate to borrow at the Fed's discount window and a number of others are effectively prohibited from doing so. For these institutions, the Federal funds market provides a convenient source of liquidity.

This market is not without its problems as a source of bank liquidity. First, the banking system may have very few excess funds which they can lend and second, this market provides only very short term funds to banks unless the loans are continually renewed. Finally, the Federal funds market is often a rather costly source of reserves since the Federal funds rate may stay above the Federal Reserve's discount rate for substantial periods of time. Still, for those banks which are willing to pay the price, who need short-term funds quickly, and who do not wish to or are not allowed to borrow at the Fed, short-term funds are available in the Federal funds market.

Liability management suggests a third source of borrowed funds--the Euro-dollar market. This is a recent development in the financial world. This market is quite informal, consisting of a loosely-knit group of buyers and sellers of internationally located dollars, and operates very much like our own over-the-counter market (67). Although the

Euro-dollar market has been used almost exclusively by larger banks, notably by money-market center institutions, some of the funds borrowed have filtered down to smaller banks by way of the correspondent banking relationship. The small number of commercial banks in this country that have had foreign currency desks for years were in an ideal situation to actively enter this new funds market and have borrowed Euro-dollars whenever domestic liquidity needs outstripped domestic liquidity resources.

A minor means of borrowing which has been used by banks from time to time is the short-term promissory note. The drawbacks of issuing this type of liability for the purpose of obtaining short-term liquid funds are obvious and thus we do not consider this borrowing avenue a very useful one in meeting deposit losses.

Finally, liability management assumes that commercial banks can borrow funds by attracting new deposit liabilities (68). To be sure, the movement of time funds among banks will do little to alter the liquidity position of the system, but individual banks can alter their liquidity profile by increasing deposits at the expense of other banks. Further, any switching which takes place between demand and time deposits will alter the liquidity of the whole banking system.

As discussed earlier, banks discovered that they were losing the savings race to their more competitive rival intermediaries and so started actively soliciting time deposits, especially savings accounts. As the 1960's passed, the competition for funds became fiercer, the Fed began restricting the growth of demand deposits, and commercial banks stepped into the time deposit field more heavily. The certificate of deposit, their most successful competitive weapon, was introduced in 1961.

The attraction of additional time deposits as a source of liquidity has some limitations which are of special significance to us here. The growth of bank time deposits depends upon the Federal Reserve Board's willingness to keep Regulation Q ceilings at levels which do not hamper commercial banks in their competition for interest-sensitive funds--according to a number of sources.

Regulation Q ceilings, when not predictably and consistently applied, when fluctuating between being inoperative and completely inhibiting to time deposit growth, tend to introduce random fluctuations into deposit velocity. During strong economic expansions, when Regulation Q becomes operative, this instrument becomes a double-edged sword: not only can banks no longer count on time deposits as a source of liquidity, but to the extent that these deposits leave the banking system and return soon thereafter as demand deposits, banks now have additional needs for liquidity. If these losses of time deposits are extreme, financial chaos in the banking system may be the result (69).

Time deposits, since they are both liquidity requiring and liquidity producing, can become a major problem for bank management, and in any event, are unlikely to be a reliable source of liquidity funds at times when banks need them the most (70).

Shiftability theory.--Many bankers and economists consider the investment portfolio or the secondary reserve of the bank to be the only dependable source of liquidity (71) and the shiftability theory of liquidity to be the only reliable guideline for banks to follow. While this may be a somewhat narrow view today, nevertheless commercial bank liquidity is importantly served by a highly marketable, negotiable securities portfolio. When cash is needed to meet deposit withdrawals (or to secure additional loans), these liquid assets can be sold or used as collateral for short-term loans to produce the needed funds. There is considerable controversy, however, over what constitutes an acceptable security for the liquidity reserve.

Liquidity, as a cushion to meet changes in cash demands, is essentially a time concept. It refers to the ability to convert financial assets into cash with very little loss of principal. Cash itself is, of course, perfectly liquid. The point remains that because of the time value of money, the longer the maturity of the non-cash asset the greater the changes that may occur in market interest rates and hence in the market value of the instrument. The present value or market value of an instrument is a function of time to maturity, current levels of interest rates on comparable securities, and the coupon rate of the instrument such that a given change in long-term interest rates will cause a larger change in the market value of the security than would the same change if it were applied to a shorter-term instrument.

Thus, banks which concentrate their secondary reserve in short-term assets tend to decrease the amount of uncertainty surrounding the market value of the security portfolio and are more liquid than banks which stretch out the average maturity of their liquidity resources by including longer-term instruments in the reserve (72). The composition of a bank's liquidity reserve depends importantly upon how bank management views the future.

The dilemma of which assets are suitable for inclusion in the secondary reserve of a commercial bank is complicated by the practice of pledging liquid assets against deposits of certain important depositors, primarily municipal and Federal governments. Even though studies have concluded that this practice, required by the public bodies, is outdated, destabilizing, arbitrary, and discriminatory, it still continues at many banks in the nation (73).

While we share the American Bankers Association attitude that no clear-cut lines on liquid asset appropriateness can be drawn (74), and while we recognize that each individual bank in the system will draw these lines in light of current and future expected experiences, we tend to agree with the Fed's guidelines on this subject. The Fed has suggested that liquid assets in the secondary reserve include short-term and medium-term U.S. Governments, loans to security dealers, bankers acceptances, other short-term open market paper, and balances with other banks (75). These assets, along with such vault cash as is available in the system, serve as important resources to meet unexpected cash drains from banks.

Finally, according to the shiftability theory, there are two other types of assets which could be sold by banks if absolutely necessary: loans and investment securities. These asset classes are not, in fact, generally considered sources of liquidity at all. It is frequently remarked that before such sales were allowed to occur or to build, monetary authorities would move into the market with the full force of their own lending powers, obviating the need for banks to take such drastic measures. If however these sales were not anticipated by the Fed or were the result of conscious tight money pressures, they might continue for some time. This possibility is important to us, for it indicates that sales of these latter types of assets to meet liquidity needs would imply that the needs were most pressing and large such as the type we would expect in a liquidity crisis.

Summary

Liquidity is a portfolio requirement of great concern to commercial banks and although the central bank stands ready to support the system in times of unusual financial strain, it is up to the individual bank to provide for its own liquidity resources in normal times. To this end, a bank must forecast potential future ranges of liquidity needs and must plan for liquid sources of funds to meet these needs. The state of liquidity preparedness for both single banks and for the industry can be roughly estimated by examining certain liquidity ratios which show the general balance between these needs and resources. In times of deposit losses from banks, the three liquidity theories we have just reviewed suggest that liquid resources come from vault cash, borrowings at the Fed, borrowings in the Federal Funds market, Euro-dollar borrowings, and sales of bank assets.

Commercial Bank Portfolio Theory

Our study is interested, in part, in uncovering commercial bank reaction to deposit losses and hence must review the literature pertaining to the priorities banks tend to follow under such conditions. It is not sufficient for our purposes to list the liquid resources available to banks to meet these drains. Knowing the ranking of these alternative sources will give us an indication of the seriousness of deposit losses, if and when they occur, and should give us a basis upon which to identify periods of liquidity crisis in the banking system.

Economists have been studying the system of commercial bank investment priorities--the manner in which banks allocate the funds made available to them through demand or time balances and the manner in which they will liquidate assets to meet deposit drains--for many years. Changes in deposit levels evoke behavioral responses via the portfolio adjustment process as bankers buy and sell assets and/or liabilities to re-establish portfolio equilibrium (76).

It is important for economists and policymakers to be able to predict bank reaction to shifts in bank liabilities as they assess the effect of such reactions on changes in levels of national income and national product, their final economic goals. Indeed, if economists are to plan and execute monetary policy which encourages long-term economic growth while simultaneously smoothing out short-term fluctuations in that growth, they must be able to explain this equilibrating process. Specifically, they must find answers to the following questions (77):

1. To what extent and through what channels does the Federal Reserve influence bank loan and investment policy?
2. What criteria do bankers apply in choosing among the various possible alternative assets available to them?

3. What is the meaning of the term "loaned up" as applied to a bank's willingness or ability to accommodate loan demands?
4. What priorities, if any, do banks place on the selection process during bank expansion and bank contraction?
5. Are there any systematic differences in bank portfolio policies over the cycle?

The answers to these questions and to our inquiry about the order of liquid resources as banks lose deposits should be enveloped within one or the other of two main theories of bank portfolio behavior, the service or accommodation theory (78), or the profit maximization principle (79). While these two theories tend to assign different priorities to the acquisition and liquidation of assets in the bank portfolio, both assume that "commercial bankers attitudes toward portfolio size and composition are necessarily and intimately related to their views on liquidity and the ways in which they estimate their liquidity needs" (80).

Accommodation Portfolio Theory

The accommodation theory of bank portfolio selection asserts that the demand for loans, particularly business loans, determines the composition of the asset portfolio with all other assets being residually selected (81). Under the approach, a bank's liquidity needs (based on a given or reasonably predictable liability portfolio) are given first priority, followed closely by the meeting of all legitimate and sound loan demands. The acquisition of investment securities is given last priority and is undertaken only when surplus funds--not needed for liquidity or loan purposes--are available.

We might expect that in a period of strong loan demands, a bank's portfolio would consist only of small amounts of cash and very short-term liquid securities, and a large volume of loans. Usually, however, even during booms, the portfolio selection process of commercial banks stops short of this type of portfolio because of three factors: some securities, even a small amount, are usually held as speculative reserves; some securities must be held as collateral for public deposits; and the accommodation principle is diluted by the profit motive (82). This latter exception means that those securities (especially tax-exempts) which yield higher after-tax returns than loans will find a place in the bank asset portfolio. Thus, while not usually found in its pure form, the accommodation principle envisions bank portfolio choices as having a liquidity-loan-investment priority with very little emphasis on the latter. This portfolio theory has a great many followers and indicates that loans have a special place in commercial bank portfolios.

The accommodation principle has certain consequences for credit allocation, monetary policy, and economic growth. Restrictive monetary actions which tend to slow the growth of total bank reserves will have very little effect on the quantity of bank business loans since commercial banks will meet these demands first even if this means cutting back on acquisitions of securities, selling some securities outright, or cutting back other loan customers' demands (83). Relevant to our interest here, it means that loans will be the last asset to be sold under liquidity duress.

The Profit Maximization Principle

The profit maximization theory is the more recent explanation of bank asset selection and liquidation. It views the commercial bank as an "investor in financial assets motivated by a desire for profit together with an aversion to risk and faced with the task of selecting assets to achieve an optimum portfolio in which yield and risk are appropriately balanced" (84).

The profit maximization theory views the bank as a business (85). Like a manufacturing firm, the bank must incur certain production costs as it obtains raw materials (funds), is constrained within certain production functions, and "manufactures" certain income-earning assets as products. The bank tries to obtain acceptable levels of profits in this process, balanced by certain liquidity requirements--much the same as any business (86). Liquidity is necessary for the bank because it cannot accurately predict future deposit flows, loan demands, interest rates, and monetary actions.

The world is quite different under this scheme One author explains that under the profit maximization principle,

> the individual bank is not constrained by any fixed quantum of reserves. It can obtain additional reserves to meet requirements by borrowing from the Federal Reserve, by buying Federal funds from other banks, by selling or running off short-term securities. In short, reserves are available at the discount window and in the money market, at a price. This cost the bank must compare with available yields on loans and investments. If those yields are low relative to the cost of reserves, the bank will seek to avoid borrowing reserves and perhaps hold excess reserves instead. If those yields are high relative to the cost of borrowing reserves, the bank will shun excess reserves and borrow reserves occasionally or even regularly (87).

The implications of this explanation of commercial bank portfolio behavior for monetary policy are quite different than the accommodation explanation. Here it is market and economic forces which are influencing bank asset selection (88). Banks are competitively engaged in the selection of both the liability and asset portfolios and their goal is the "purchase" of minimum cost inputs (deposits) and the "sale" of maximum yield outputs (loans and investments). During periods of monetary restraint, this principle would mean a more even slowing of the growth rate of both loans and investments, with business loan growth continuing unabated only if interest rates on loans rose relative to interest rates on investments (89). Further, deposit losses would be met in the leasty costly way, whether that be by borrowing or through the sale of bank assets. No priority is given here to any one avenue of adjusting the bank's portfolio.

The Evidence

Only a few studies have concluded that commercial banks still adhere closely to the undiluted accommodation portfolio principle (90). These studies find that business loans will be met first, then other loan demands, and then only residually will funds be used to purchase securities. At least two studies have concluded that the profit maximization principle is not a good predictor of bank portfolio behavior (91).

Most recent studies have concluded that changes in bank liabilities and assets conform, in general, to the profit-maximization principle (92). One study described this pattern as a rather recent phenomenon, noting that

> since about 1960, many new developments have occurred in the area of commercial banking. Observers of bank behavior since then have suggested that banks have become more aggressive competitors among themselves and in their relationships with other financial intermediaries. They appear to have become more profit-oriented, i.e., basing decisions on assets acquired and liabilities offered on cost and yield considerations. New liability forms have been developed such as marketable and consumer type CD's. This development suggests that banks may have become more willing to compete for funds from many sources on the basis of rates paid. Asset adjustments, when required, appear to be made more on the basis of cost considerations. Banks in

> their quest for profits have entered into new lending areas such as municipal bonds and mortgages.... Holdings of U.S. Government securities by banks have reached a low level (93).

A number of studies have found that bank portfolio behavior is really a combination of the two principles of portfolio management, but that banks tend to favor business loan customers under conditions of credit rationing (94). According to their findings, banks try to meet all legitimate loan requests first, but will temper this accommodation by ranking the loans on a rate-of-return basis, by investing in high-yield securities, and by searching for additional funds on a least-cost basis. This suggests that the accommodation principle carries less weight than formerly and that the total profit-oriented approach to bank portfolio management now operates side by side with the older selection process.

We conclude that current bank portfolio behavior is increasingly motivated by the profit-maximization principle although we can still find evidence of the service principle operating especially when money is tight, when interest rates rise to very high levels, and when inflation is likely to render nominal interest comparisons meaningless. Under these conditions, the price system fails to serve as an adequate allocator of resources and qualitative factors again dominate lending practices. This leads us to believe that deposit losses experienced in a boom would be met by sources other than the liquidation of loans or longer-term securities. Since it seems unlikely that except in times of financial panic banks would be forced to sell loans--their highest earning least marketable asset--we focus our attention on sales from the investment portfolio, particularly sales of municipals.

Commercial Banks and Municipal Securities

State and local government securities have grown phenomenally during the last decade as local governments found their current tax receipts lagging and their responsibilities to the community mushrooming. Debt obligations of these governmental units are attractive to commercial banks because of their general high quality, their high marketability, their diversity, and of course, their tax-exemption (95). While some banks hold small amounts of these instruments because of their feeling of social responsibility to the local community (96), most banks consider good quality municipals as attractive income-earning assets in their own right.

We are interested in determining the factors which affect bank acquisition of municipals in order that we understand their place in the bank portfolio and that we have a clear picture of conditions which would call for outright sales of these securities. Accordingly we found a number of sources which related bank holdings of municipals positively to the yield on these instruments, positively to levels of total bank assets and to levels of time deposits (97), and negatively to bank loan demands (98).

One study done in this area tends to support the accommodation principle as the powering force behind commercial bank holding of municipals, suggesting that bank owned municipal securities tend to be inversely related to bank business loans (99). Banks thus supposedly regard municipals as alternatives to loans such that holdings of bank municipals would be expected to fluctuate countercyclically to economic conditions, increasing during recessions and decreasing during booms.

Another study linked the rapid growth in bank holdings of municipals and other longer-term securities to increases in Regulation Q ceilings in 1957, 1962, 1963, and 1964 (100). It seems entirely plausible to us that if increases in Regulation Q could have this effect on acquisitions of municipals, then a restrictive level of Q could indeed cause commercial banks to sell part of their holdings of these securities. The mixed findings in this area indicate that more research needs to be done if we are to gain a fuller knowledge of bank portfolio processes.

Summary

This chapter has surveyed topics related to the central interest of our study, the sequence of events which might follow from a restrictive setting of maximum interest rates payable on commercial bank time and savings deposits. We have reviewed studies which indicate that bank time and savings deposits do tend to be sensitive to yield differentials with the implication that adverse interest spreads could cause a net loss of these liabilities at banks. The literature dealing with commercial bank liquidity provisions and policies, although mostly empirically untested, leads us to conclude that deposit losses are a prime concern of bank management and would be met from a number of different sources, depending upon the severity of the losses.

Further, we have surveyed the literature pertaining to the priority of bank portfolio decisions on the assumption that if we can specify the order in which liquid resources would likely be tapped to meet deposit drains, we could in fact draw some conclusions in our own empirical testing about the seriousness and impact of time deposit losses from banks. We found that banks will tend to draw upon sources open to them to meet such losses in the following general order. cash on hand, borrowing and the sale of assets from the liquidity reserve, and only finally some portion of the true income-producing assets of the bank. Both portfolio theories we examined point toward this system of priorities.

In the next chapter then, we take the information gleaned from these past studies and formulate it into testable theories about the behavior of bank time deposits and some of the consequences following that behavior in the last decade. Chapter VI contains the results of our research, and Chapter VII, the final chapter, attempts to reconcile our findings with what we could have expected from past research in these areas.

NOTES

1. John G. Gurley and Edward S. Shaw, "Financial Aspects of Economic Development," *American Economic Review* (September, 1955), pp. 521, 537; John G. Gurley and Edward S. Shaw, "Financial Intermediaries and the Savings-Investment Process," *Journal of Finance* (May, 1956); Edgar L. Feige, *The Demand for Liquid Assets: A Temporal Cross-Section Analysis* (Englewood Cliffs: Prentice-Hall, 1965), p. 8; Ernest Bloch, "Two Decades of Evolution of Financial Institutions and Public Policy," *Journal of Money, Credit, and Banking* (May, 1969), p. 557; Lawrence S. Ritter, *Regulation Q: Issues and Alternatives* (Chicago: Association of Reserve City Bankers, 1965), p. 17; James Tobin, "Commercial Banks as Creators of 'Money,'" in *Banking and Monetary Studies*, edited by Deane Carson (Homewood, Illinois: Richard D. Irwin, Inc., 1965); Albert H. Cox, *Regulation of Interest Rates on Bank Deposits*, Michigan Business Studies (Ann Arbor, 1966), p. 130; Bruce Cohen and George G. Kaufman, "Factors Determining Bank Deposit Growth by State: An Empirical Analysis," *Journal of Finance* (March, 1965), p. 59; Jules I. Bogen and Herman E. Krooss, *Savings and Other Time Deposits in Commercial Banks* (Chicago: Association of Reserve City Bankers, [illegible]), p. 14; American Bankers Association, *The Commercial Banking Industry* (Englewood Cliffs: Prentice-Hall, Inc., 1962), p. 81; George Garvy, "Deposit Velocity and Its Significance," *Monthly Review* (New York: Federal Reserve Bank of New York, 1965), pp. 82-86; Harry G. Johnson, "Monetary Theory and Policy," *American Economic Review* (June, 1966), p. 373; V. Karuppan Chetty, "On Measuring the Nearness of Near-Monies," *American Economic Review* (June, 1969), p. 270; Michael J. Hamburger, "The Demand for Money by Households, Money Substitutes, and Monetary Policy," *Journal of Political Economy* (December, 1966), pp. 600-23; Milton Friedman and David Meiselman, "The Relative Stability of Monetary Velocity and the Investment Multiplier in the U. S., 1897-1958," in *Stabilization Policies* (Englewood Cliffs: Prentice-Hall, Inc., 1963).

2. Our discussion of bank time deposits has essentially ignored the fact that "bank time deposits" are not a homogeneous class of financial claims. These liabilities, differentiated on the basis of ownership, size, length to maturity, and withdrawal provisions, and denomination include the following types of deposits: savings deposits, negotiable CD's, non-negotiable CD's, short-term CD's, long-term CD's, Christmas Club accounts, and time deposits open account.

In reality then there are a number of different types of time deposits at commercial banks and each type tends to exhibit different characteristics from the norm or "average" time deposit. This will be discussed more fully later See "Sources of Commercial Bank Funds," p. 159.

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4. See Sandra B. [illegible], *The Determinants of Supply and Demand for* [illegible] of Michigan, [illegible] of Deposit [illegible] University of [illegible] for Deposit-Type [illegible] University [illegible] An [illegible] Model of the [illegible] Chicago [illegible] Monetary Management [illegible] and [illegible] Interest [illegible] J. [illegible] and [illegible] William S. New Bend, [illegible] for Deposits Between [illegible] and Nonbank Financial [illegible] 1967).

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7. "Time and Savings Deposits in the Second District Since the Change in Regulation Q," *Monthly Review* (New York: Federal Reserve Bank of New York, April, 1963), pp. 58-60; William L. Silber, "Open Market Rates and Regulation Q," *National Banking Review* (March, 1967), pp. 299-300; Rozen, p. 326, Bogen and Krooss, pp. 47, 56, Brill, p. 26.

8. Charles M. Linke, *Interest Rate Regulation on Commercial Bank Deposits: Its Evolution and Impact in the State of Indiana* (Indiana University. 1966); Jerry W. Lee, *Changing Liquidity Patterns in the American Banking System* (University of Florida: 1969); and Paul S. Nadler, "Discussion," *Journal of Finance* (May, 1969), p. 293. See also a number of articles in the Federal Reserve Bulletin from 1966 through 1971 concerning credit conditions, bank time deposits, and Regulation Q ceilings.

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10. Richard Fieldhouse, *Certificates of Deposit*, The Bank Study Series (Boston: Bankers Publishing Co., 1962), p. 3; "Sources of Bank Funds," p. 159; Ritter, pp. 14-15.

11. Bogen and Krooss, p. 26.

12. Ritter, p. 19.

13. *Ibid.*, p. 19.

14. "Negotiable Time Certificates of Deposit," *Federal Reserve Bulletin* (April, 1963), p. 459.

15. "Time and Savings Deposits in Second District," pp. 58-60.

16. *Ibid.*, p. 59.

17. Ritter, pp. 17-18.

18 "Negotiable Time Certificates," pp. 460, 462; Ritter, p. 18; and Fieldhouse, p. 44.

19. See Caroline H. Cagle, "Changes in Time and Savings Deposits, December 1965--May 1966," *Federal Reserve Bulletin* (August, 1966), pp. 1102-36, Caroline H. Cagle, "Changes in Time and Savings Deposits, May 1955-January 1967," *Federal Reserve Bulletin* (April, 1967), pp. 517-33. Caroline H. Cagle, "Changes in Time and Savings Deposits, July 1967--October 1967," *Federal Reserve Bulletin* (January, 1968), pp. 41 62, Caroline H. Cagle, "Changes in Time and Savings Deposits, January--April 1969," *Federal Reserve Bulletin* (July, 1969), pp. 581-90, Caroline H. Cagle, "Changes in Time and Savings Deposits, July--October 1969," *Federal Reserve Bulletin* (March, 1970), pp. 211-24, and Caroline H. Cagle, "Changes in Time and Savings Deposits, April--July 1970," *Federal Reserve Bulletin* (November, 1970), pp. 803 13.

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34. *Ibid.*, p. 55.

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38. The Board of Governors of the Federal Reserve System, "Processes and Procedures Involved in the Formulation and Execution of Monetary Policy," *The Federal Reserve and the Treasury: Answers to Questions From the Commission on Money and Credit* (Englewood Cliffs: Prentice-Hall, 1963), pp. 4-22; Lee, p. 51; and Hodgman, p. 71.

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59. Axilrod, p. 1166.

60. See *Federal Reserve Bulletin*, recent issues.

61. Fieldhouse, pp. 16-19.

62. Ritter, pp. 12-16.

63. Lee, pp. 52-3; and Fieldhouse, pp. 20-21.

64. Axilrod, p. 1169.

65. Axilrod, p. 1171; and "What Price Liquidity?" p. 28.

66. Hodgman, p. 76; and Axilrod, p. 1171.

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82. Hodgman, pp. 39, 71.

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CHAPTER V

THE HYPOTHESES AND TEST PROCEDURES

Introduction

While a number of avenues of investigation are open to the student of this monetary instrument, we will concentrate our research on those areas which we believe possess the largest potential dangers for financial stability in this country and exhibit potential for reoccurrence in the future. Specifically, we will examine the coincidence of periods when we can say that Regulation Q was operating to inhibit commercial bank competition for time and savings deposits and periods when these institutions (a) lost time deposits, (b) faced serious liquidity pressures, or (c) sold unlikely candidates from their asset portfolios.

We desire to know the probability that commercial banks will lose time deposits if they are prohibited from competing for these funds by relatively low levels of Regulation Q ceilings. We must then investigate the levels of interest sensitivity of bank time deposits.

If these deposits do not react at all to changing interest rate differentials, then the growth of bank time deposits is partially isolated from cyclical business conditions and countercyclical monetary policy. Under these conditions we need have little fear of restrictive Regulation Q ceilings and their implications for the stability of commercial bank portfolios and financial markets. If, on the other hand, bank time deposits do react to yield spreads in a significant way, we must examine the implications of this finding.

In particular, we will look at levels of commercial bank liquidity, not in order to measure adequacy _per se_ because this is a condition which is very difficult to assess for the banking system or for an individual bank and which we will essentially take as given. We will assume that within limits commercial bank managers have adequately prepared for liquidity needs except where we find significant and abrupt changes in the levels of bank liquidity. Particularly we are interested in periods when these changes coincide with periods of Regulation Q restrictiveness and/or losses of bank time deposits. Such deviations would tend to indicate that factors which bank managers did not or could not reasonably take into account in setting aside their liquid resources were, in fact, operating.

Finally we will investigate periods of bank sales of municipal securities from the asset portfolio on the theory that such sales, because they tend to be at the end of the line of possible liquidity resources, indicate a rather serious forecasting error on the part of bank managers with regard to liquidity needs. Periods of such "errors" can then be compared to periods when (a) Q ceilings were operative, (b) banks lost time deposits or (c) banks experienced significant deviations from expected liquidity ratios.

Setting of the Study

Our investigations depend importantly upon our ability to specify periods when we can reasonably assert that Regulation Q effectively prohibited commercial banks from using changes in interest rates paid on time and savings deposits as competitive tools. While the existence of this condition has recently and frequently been assumed by many critics, we felt that an empirical investigation and specification of these restrictive periods was crucial at this point for several reasons. First, none of the studies we examined had done this. We found only the vaguest references in the literature to periods when Regulation Q apparently had impeded commercial bank interest rate competition. Second, we needed to substantiate the existence of any of these periods, in a way that could withstand empirical argumentation (or be considered "reasonable") if we were to have testable hypotheses at all. Third, we needed the exact periods when Regulation Q was used restrictively for use in comparison with other dates that would be selected in the testing of our theories.

Accordingly, the first part of this chapter is directed toward identifying restrictive periods of Regulation Q ceilings, the second part toward setting our the hypotheses and methodology for testing the hypotheses that follow from the evidence in the literature and the identification of these important periods of a restrictive Regulation Q. Ideally we would like to be able to compare average rates paid by banks on individual types and maturities of time deposits with their respective Regulation Q ceiling rates for tho[illegible]. As we began our study, we found that we were seriously hampered in this task.

Neither member banks nor, to our knowledge, insured commercial banks in this country were required to report holdings of time and savings deposits broken down into Regulation Q categories nor were they required to report interest rates paid on this disaggregated basis. Quite obviously it was impossible for us to reach our ideal here.

This data problem has been common to all recent investigations of bank time deposit growth. In an effort not only to aid research in this area but also to serve as justification for setting different Q ceilings on various categories of time and savings deposits, the Fed recently started requiring more detailed information on time deposit holdings of member banks (1)*. Because this information was only available on deposit holding after April, 1970, it clearly was of little use in our study.

In spite of this problem, if our study was ever to materialize at all, we needed to have some measure of rates paid on time and savings deposits versus either maximum ceiling rates allowable by law or some unregulated competitive interest rate series. We had a choice among several interest rates: the average interest rate paid on total member bank time and savings deposits (2), the market yield on three-month Treasury bills, the weighted average level of Regulation Q ceiling rates (1), the average rates of return paid on savings and loan association shares, and the rates paid on mutual savings bank deposits.

This seems an appropriate point to comment on both the time period for the study and the time intervals for our observations. We chose the period from mid 1961 through mid-1970 for our empirical tests. The beginning date was chosen as the approximate point when we can claim that commercial banks became seriously interested in expanding their portfolios via increases in time and savings deposit holdings. We needed to be able to assume reasonable homogeneity of bank portfolio reaction in order to assert that Regulation Q ever effectively prohibited commercial bank competition in these markets. Before 1961, such low levels of Regulation Q ceilings as did occur did not serve to block bank solicitation of time and savings deposits because banks were simply not actively engaged in time deposit competition.

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*The FDIC has followed suit.

Mid-1970 seemed to be an appropriate ending point for our research because it enclosed those periods of extreme financing demands which we are interested in and because it is one of the latest dates for which we were able to gather consistent and accurate data for the study.

We also needed to make a decision about the frequency of data observations since some of our series were available on a weekly, some on a monthly, some on a quarterly and some only on a yearly basis. It was felt first of all that the types of financial responses we would be investigating would be largely "swallowed up" in quarterly or yearly figures. The ideal series for this type of research would have been weekly observations, but the latter were found to be almost universally unavailable (except for levels of total time and savings deposits at all commercial banks). In fact, monthly observations over the period were not always easy to obtain. These limitations dictated the use of a monthly time interval.

Second, if we use monthly data from July, 1961, through June, 1970, we have a sample containing 108 observations, whereas quarterly figures will only generate 36 data points--a sample size just marginally above "small," and hence plagued by small sample biases and problems.

Third, a number of the most important series in our investigation are available on a monthly basis (open market interest rates and bank time and savings deposits, and it was felt that aggregating to a quarterly basis would dilute the strength of observed patterns in the data.

Fourth, one of the most important series in this study, rates paid on bank time and savings deposits, was available only on an annual basis and hence would require some amount of interpolation* unless we used yearly time intervals which we had already rejected for a study of this type. Interpolation to monthly figures was thought to be no more harmful than interpolation to quarterly data for the reliability of our results Our study then covers a full nine years and our observations are taken at monthly intervals.

On the theory that commercial banks compete with several nonbank financial intermediaries and in the open market for time funds, and on the theory that they tend to be prohibited in this competition by low levels of

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*Interpolation was the only method used to complete data series.

Regulation Q ceilings, we needed a comparison of some or all of these rates. It was felt that comparisons of one series with another on an absolute basis, while interesting, would be of little help in determining apparent degrees of Regulation Q's restrictiveness, and therefore we constructed ratios of bank time deposit rates and these other rates.

Looking in Table V-1 at the TD/SLA and TD/MSB series, we note that the changes which are occurring are almost completely devoid of cyclical fluctuations. Because commerical bank and nonbank financial intermediary time liability interest rates both tend to change slowly, because after 1966 nonbank financial institutions were also subject to interest rate ceilings, and because all three rate series (time deposits, mutual savings bank deposits, and savings and loan associations shares) had to be interpolated from annual averages, this steady movement is not surprising. We do not consider these two ratios to be of much use in determining when Regulation Q was operative at commercial banks.

The TD/TB and TD/MAX ratios are much more useful to us here. We would expect that as Regulation Q became more restrictive, the TD/TB ratio would decline and the TD/MAX ratio would tend to approach its theoretical limit of 1.00 (4). We will use both of these ratios to pinpoint when Regulation Q was operative.

TABLE V-1. INTEREST RATES PAID ON COMMERCIAL BANK TIME AND SAVINGS DEPOSITS AND COMPETING INTEREST RATES, 1961-1970

DATE		Interest Rates (in percent) TD[a]	TB[b]	SLA[c]	MSB[d]	MAX[e]	Ratios[f] TD/TB	TD/SLA	TD/MSB	TD/MAX
	J	2.77	2.24	3.91	3.57	2.99	123.5	70.8	77.6	92.6
	A	2.81	2.39	3.93	3.60	2.99	117.5	71.5	78.0	94.0
1961	S	2.85	2.28	3.94	3.62	2.98	124.9	72.3	78.7	95.3
	O	2.90	2.30	3.96	3.65	2.98	126.0	73.2	79.4	97.3
	N	2.94	2.48	3.97	3.67	2.98	118.5	74.1	80.1	98.6
	D	2.98	2.60	3.99	3.70	2.98	114.6	74.7	80.5	100.0
	J	3.02	2.72	4.00	3.73	3.71	111.0	75.5	81.0	81.4
	F	3.06	2.73	4.02	3.75	3.71	112.0	76.1	81.6	82.5
	M	3.11	2.72	4.03	3.77	3.71	114.2	77.2	82.4	83.8
	A	3.15	2.73	4.05	3.80	3.71	115.3	77.8	82.9	84.9
	M	3.19	2.68	4.06	3.82	3.71	119.0	78.6	83.5	86.0
1962	J	3.23	2.73	4.08	3.85	3.71	118.3	79.2	83.9	87.1
	J	3.24	2.92	4.09	3.86	3.71	110.0	79.2	83.9	87.3
	A	3.25	2.82	4.10	3.87	3.71	115.2	79.3	84.0	87.6
	S	3.25	2.78	4.10	3.88	3.71	116.9	79.3	83.8	87.6
	O	3.26	2.74	4.11	3.89	3.70	119.0	79.3	83.8	88.1
	N	3.27	2.83	4.12	3.90	3.70	115.5	79.4	83.8	88.4
	D	3.28	2.87	4.12	3.91	3.70	114.3	79.6	83.9	88.6
	J	3.29	2.91	4.13	3.92	3.70	113.0	79.7	83.9	88.9
	F	3.30	2.92	4.14	3.93	3.70	113.0	79.7	84.0	89.2
	M	3.31	2.89	4.15	3.94	3.70	114.5	79.8	84.0	89.4
	A	3.32	2.90	4.15	3.95	3.70	114.4	80.0	84.0	89.7
	M	3.33	2.92	4.16	3.95	3.70	114.0	80.0	84.3	90.0
1963	J	3.34	2.99	4.17	3.96	3.70	111.8	80.1	84.3	90.3
	J	3.35	3.18	4.17	3.97	3.80	105.3	80.3	84.4	88.2
	A	3.36	3.32	4.17	3.98	3.80	101.1	80.6	84.4	88.4
	S	3.37	3.38	4.17	3.98	3.80	99.7	80.8	84.7	88.7
	O	3.38	3.45	4.17	3.99	3.80	98.0	81.0	84.7	88.9
	N	3.39	3.52	4.18	4.00	3.80	96.3	81.1	84.8	89.2
	D	3.41	3.52	4.18	4.01	3.80	96.9	81.6	85.0	89.7
	J	3.42	3.52	4.18	4.02	3.80	97.2	81.8	85.1	90.0
	F	3.43	3.53	4.18	4.02	3.80	97.2	82.0	85.3	90.3
	M	3.44	3.54	4.19	4.03	3.80	97.2	82.1	85.4	90.5
	A	3.45	3.47	4.19	4.04	3.80	99.4	82.3	85.4	90.8
	M	3.46	3.48	4.19	4.05	3.80	99.4	82.6	85.4	91.0
1964	J	3.47	3.48	4.19	4.06	3.80	99.7	82.8	85.5	91.0
	J	3.49	3.46	4.19	4.06	3.80	100.8	83.3	86.0	91.8
	A	3.51	3.50	4.20	4.07	3.80	100.3	83.6	86.2	92.4
	S	3.53	3.53	4.20	4.07	3.80	100.0	84.0	86.7	92.9

TABLE V-1 (continued)

		Interest Rates (in percent)					Ratios[f]			
DATE		TD[a]	TB[b]	SLA[c]	MSB[d]	MAX[e]	TD/TB	TD/SLA	TD/MSB	TD/MAX
	O	3.55	3.57	4.20	4.08	3.80	99.4	84.5	86.7	92.9
1964	N	3.58	3.64	4.21	4.08	3.80	98.4	85.0	87.7	94.2
cont.	D	3.60	3.84	4.21	4.08	4.14	93.7	85.5	88.2	87.0
	J	3.62	3.81	4.21	4.09	4.14	95.0	86.0	88.5	87.4
	F	3.64	3.93	4.22	4.09	4.14	92.6	86.3	89.0	87.9
	M	3.67	3.93	4.22	4.10	4.14	93.4	87.0	89.5	88.6
	A	3.69	3.93	4.23	4.10	4.14	93.9	87.2	90.0	89.1
	M	3.71	3.89	4.23	4.11	4.14	95.4	87.7	90.3	89.6
1965	J	3.73	3.80	4.23	4.11	4.14	98.2	88.2	90.8	90.8
	J	3.76	3.83	4.25	4.14	4.14	98.1	88.5	91.1	91.8
	A	3.80	3.84	4.27	4.17	4.14	98.9	89.0	91.2	92.5
	S	3.83	3.92	4.29	4.20	4.14	97.7	89.3	91.5	93.2
	O	3.86	4.02	4.30	4.22	4.14	96.0	89.8	91.5	94.0
	N	3.89	4.08	4.32	4.25	4.14	95.3	90.0	91.5	94.0
	D	3.92	4.37	4.34	4.28	4.44	89.6	90.3	91.6	88.3
	J	3.95	4.58	4.36	4.31	4.46	86.3	90.6	91.6	88.6
	F	3.98	4.65	4.38	4.33	4.47	85.6	90.0	91.9	89.0
	M	4.01	4.58	4.39	4.36	4.48	87.5	91.3	92.0	89.5
	A	4.04	4.61	4.41	4.39	4.50	87.5	91.6	92.0	89.8
	M	4.07	4.63	4.43	4.42	4.51	87.7	91.9	92.1	90.2
1966	J	4.11	4.50	4.45	4.45	4.52	91.4	92.4	92.4	90.9
	J	4.13	4.78	4.47	4.47	4.48	86.4	92.4	92.4	92.2
	A	4.14	4.95	4.49	4.50	4.49	83.6	92.2	92.0	92.2
	S	4.16	5.36	4.51	4.52	4.44	77.5	92.9	92.0	93.7
	O	4.18	5.33	4.52	4.55	4.45	78.5	92.5	91.9	93.9
	N	4.20	5.31	4.54	4.57	4.46	79.0	92.5	91.9	94.2
	D	4.21	4.96	4.56	4.60	4.46	84.9	92.3	91.5	94.4
	J	4.23	4.72	4.58	4.62	4.47	89.7	92.4	91.6	94.6
	F	4.25	4.56	4.60	4.65	4.47	93.2	92.4	91.4	95.1
	M	4.27	4.26	4.61	4.67	4.48	100.1	92.6	91.4	95.3
	A	4.28	3.84	4.63	4.69	4.48	111.4	92.4	91.2	95.5
	M	4.30	3.60	4.65	4.72	4.49	119.4	92.5	91.1	95.8
1967	J	4.32	3.53	4.67	4.74	4.49	122.2	92.5	91.1	96.2
	J	4.34	4.20	4.67	4.74	4.50	103.2	92.9	91.6	96.6
	A	4.36	4.26	4.67	4.74	4.50	102.1	93.4	92.0	96.9
	S	4.38	4.42	4.67	4.74	4.50	99.2	93.8	92.4	97.3
	O	4.40	4.55	4.67	4.74	4.50	96.7	94.0	92.8	97.8
	N	4.42	4.72	4.67	4.75	4.50	93.8	94.6	93.0	98.2
	D	4.44	4.96	4.68	4.75	4.50	89.5	94.9	93.5	98.7

TABLE V-1 (continued

DATE		Interest Rates (in percent)					Ratios[f]			
		TD[a]	TB[b]	SLA[c]	MSB[d]	MAX[e]	TD/TB	TD/SLA	TD/MSB	TD/MAX
	J	4.46	4.99	4.68	4.75	4.50	89.5	95.3	93.9	99.1
	F	4.48	4.97	4.68	5.75	4.50	90.2	95.7	94.3	99.6
	M	4.50	5.16	4.68	4.75	4.51	87.1	96.2	94.7	99.8
	A	4.52	5.37	4.68	4.75	4.87	84.1	96.6	95.2	92.8
	M	4.54	5.65	4.68	4.75	4.87	80.3	97.0	95.6	93.2
1968	J	4.56	5.52	4.68	4.76	4.87	82.7	97.4	95.8	93.6
	J	4.57	5.31	4.68	4.77	4.88	86.0	97.4	95.8	93.6
	A	4.57	5.08	4.69	4.77	4.88	90.0	97.2	95.6	93.4
	S	4.58	5.20	4.70	4.78	4.89	88.1	97.2	95.8	93.7
	O	4.59	5.35	4.71	4.78	4.89	85.8	97.2	95.8	93.9
	N	4.60	5.45	4.73	4.80	4.89	84.4	97.2	95.8	94.1
	D	4.61	5.94	4.74	4.80	4.89	77.7	97.2	96.0	94.3
	J	4.61	6.13	4.75	4.81	4.89	75.2	97.0	95.8	94.3
	F	4.62	6.12	4.76	4.82	4.88	75.5	97.0	95.8	94.7
	M	4.63	6.01	4.77	4.83	4.88	77.0	97.1	95.8	94.9
	A	4.63	6.11	4.78	4.83	4.87	75.5	96.9	95.8	95.1
	M	4.64	6.03	4.79	4.84	4.86	76.9	96.9	95.9	95.5
1969	J	4.65	6.43	4.80	4.85	4.86	72.4	97.1	96.3	96.5
	J	4.68	6.98	4.82	4.86	4.85	67.1	97.1	96.5	97.3
	A	4.71	6.97	4.85	4.88	4.84	67.6	97.1	96.5	97.3
	S	4.73	7.08	4.87	4.89	4.83	66.8	97.1	96.7	97.9
	O	4.76	6.99	4.89	4.91	4.83	69.2	97.3	96.9	98.8
	N	4.79	7.24	4.92	4.92	4.82	66.2	97.1	97.4	99.4
	D	4.81	7.81	4.95	4.94	4.82	61.6	97.2	97.4	99.8
	J	4.84	7.87	4.97	4.95	4.91	61.4	97.4	97.8	98.6
	F	4.87	7.13	4.99	4.97	4.97	68.4	97.6	98.0	98.0
1970	M	4.89	6.63	5.02	4.98	4.98	73.9	97.4	98.2	98.2
	A	4.92	6.50	5.04	5.00	4.99	75.6	97.6	98.4	98.6
	M	4.95	6.83	5.06	5.01	5.01	72.5	97.8	98.8	98.8
	J	4.98	6.67	5.09	5.03	5.03	74.7	97.8	99.0	99.0

[a] Average interest rates paid on member bank time and savings deposits, see Appendix Table 1.

[b] U.S. Treasury Bill three month equivalent market rates, from various issues of the Federal Reserve Bulletin.

[c] Average interest rates paid on savings and loan association shares, see Appendix Table 4.

[d] Average interest rates paid on mutual savings banks deposits, see Appendix Table 5.

TABLE V-1 (continued)

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[e] Weighted average Regulation Q ceiling rates on member bank time and savings deposits, see Appendix Table 2.

[f] The ratios are simple arithmetic proportions of the interest rates paid on member bank time and savings deposits (column 1 of this table), and the other interest rates or ceilings here (given in columns 2-5).

Let us look first at the TD/TB ratio. While these two series of rates are not strictly comparable in that the numerator represents the rate paid on a class of financial claims which range from apparently quite interest-sensitive to quite interest-insensitive parts and the denominator represents a highly interest-sensitive claim, we assert that the same sorts of phenomena--changes in the relative supply of and demand for funds--are affecting each series.

It has been suggested that a 25 basis point or more premium of short-term negotiable bank CD rates above U.S. Treasury Bill yields of comparable maturity is sufficient to cause a movement of funds from the latter to the former (5). Because the average interest sensitive part of the total, a time deposit yield below Treasury Bill rates should still ensure the growth of total bank time liabilities. We suggest that an average time deposit interest rate of about one full percentage point below Treasury Bill rates adequately takes into account the diversity of differential risk factors, maturity factors, and buyer sensitivity to interest returns and would enable banks to continue to attract funds. Clearly this is an arbitrary yield spread and we must analyze the empirical data to defend it.

Upon examination of the TD and TB columns of Table V-1 we find that, based on this 1 percent criterion, we can say that Regulation Q appeared to be operative in the following months: September, October, and November, 1966; May and December, 1968; all months of 1969; and all of the first six months in 1970. Moving over to the TD/TB ratio, we note that in almost every single one of these instances the TD/TB ratio dropped below 80.0 percent. The one exception is May, 1968 where the ratio was 80.3 percent-an insignificant difference. These standards, a 1.00 percent lower TD rate than TB rate and a TD/TB ratio of 80.0 percent or below give us consistent restrictive Regulation Q periods regardless of the absolute level of rates in these markets.

As we examine the TD/MAX series we find a pattern compatible with but a bit more complex than the above analysis. If we mark those times when the TD/MAX ratio was at a level of 94 or 95 percent or above, we single out the following dates: August through December, 1961; November, 1964; November, 1965; November and December, 1966; all of 1967; January, February, March, November, and December, 1968; all of 1969; and all of the first half of 1970. This is a somewhat broader range of dates than we collected using the TD/TB ratio.

The reader will remember that various Regulation Q ceilings were raised in January, 1962, in July, 1963, in November, 1964, and in December, 1965. Immediately prior to three of these dates, the TD/MAX ratio seems to suggest only a small amount of room for commercial banks to raise rates paid on time and savings deposits. Relief came to banks reasonably swiftly during these periods as it became apparent that bank time deposit rates were indeed "bumping" against Q ceilings. For this reason we conclude that the restrictive stance of Q ceilings on these occasions was not prolonged enough to be of practical importance in our study.

Let us look at the period of 1967 next. It appears from the TD/MAX ratio that commercial banks were seriously hampered in competing for time liabilities by Regulation Q throughout the year. We suggest that while TD/MAX ratios were high in 1967, it would be hasty to conclude that Regulation Q was effectively stopping banks from entering time deposit competition. We do so on several grounds.

Changes in bank time deposit rates are known to be quite sluggish, especially in a downward direction. The demand for bank loans dropped precipitously during 1967 and it is reasonable to assume then that bank demands for additional liabilities dropped proportionately. We suggest that commercial banks could not cut offering rates on these liabilities in the interest of continuing good customer relationships unless they were sure that the long-term trend was toward lower interest rates. Further, many banks were "locked in" or committed to rather high offering rates such that time deposit rates were not cut much or at all in 1967. Some banks did lower selected time deposit rates during this period, but in general these institutions simply did not bid for or advertise time liabilities as aggressively (6). Sharp short-term changes in bank time deposits are not a part of the mainstream in banking history and in this respect 1967 seems to have been no different.

Finally, if we view the level of Treasury Bill rates during 1967, it seems that commercial bank time deposits were quite competitive (according to our criterion) for most of the year. The fact that maximum rates were low relative to time deposit rates paid would not seem to have been an important factor for time deposit growth during these months because banks had little need or desire to raise offering rates on their time liabilities. As we move into 1968 and banks re-entered the time funds markets, Regulation Q ceilings were promptly raised (in April, 1968) to levels which suggest that banks again had ample room to raise time deposit offering rates.

We are left then with the periods at the end of 1966 and with 1969 and 1970. We know that these were periods of strong demands for funds by banks. Because of the levels of competing interest rates and the closeness of time deposit rates to Regulation Q ceilings (at no time from November, 1968 through June, 1970 was the TD/MAX ratio below 94%), we suggest that both of these time periods were ones in which commercial banks would have wanted to but could find little room to raise their TD offering interest rates.

In summary, it is apparent that in two periods, the last three or four months of 1966 and from November or December, 1968, to the end of our study in June, 1970, commercial banks would have liked to raise rates of return on time deposits but could find no relief from restrictive levels of Regulation Q rates. These two periods we will call the operative periods of Regulation Q. They form the basis for the rest of the study.

Hypotheses

In recent times commercial banks have become much more aggressive competitors for time deposits, especially when bank loan demands are high and rising, when interest rates in the economy are rising, and when monetary policy is restricting the growth of bank demand deposits. Commercial banks turn to time deposits as a source of loanable funds but must offer competitive rates of return on these financial claims if they are to bid funds away from competitive uses. According to the above analysis, Regulation Q ceiling rates on time and savings deposits effectively inhibited bank competition for time funds in late 1966, in 1969, and in 1970. We wish to test the following hypotheses in an effort to determine what this inability to raise time deposit rates meant to commercial banks.

HYPOTHESIS I--COMMERCIAL BANK TIME DEPOSIT LIABILITIES ARE INTEREST SENSITIVE.

We wish to test the hypothesis specifically that bank time deposits grow in direct relationship to the growth of private and non-federal public total financial assets and to the time deposit interest rate, and that bank time deposits tend to grow in an inverse relationship to interest rates available on competing financial instruments. If this is so, then Regulation Q, when operating to keep bank time deposit rates below returns on competing instruments, would be capable of causing net losses or runoffs of total time deposits at commercial banks.

HYPOTHESIS II--LOSSES OF BANK TIME DEPOSITS WILL BE REFLECTED IN SIGNIFICANT DECLINES IN COMMERCIAL BANK LIQUIDITY RATIOS.

Specifically here we wish to determine whether runoffs of bank time deposits are large enough so as to cause a liquidity crisis in the banking system. We assume that bank liquidity ratios are already at minimum levels during periods when Regulation Q is operative, that sharp declines in bank liquidity ratios are quite uncommon, that banks cannot reasonably be expected to foresee when Regulation Q ceilings will be made operative by Federal Reserve Authorities, and that consequently banks cannot prepare for losses of time deposits due to these ceilings. We maintain that a drop in the liquidity ratio of banks equal to or greater than two times the average fluctuation in this series, especially since we are using monthly observations, could reasonably be called a "liquidity crisis."

HYPOTHESIS III--COMMERCIAL BANKS ARE FORCED TO SELL MUNICIPAL SECURITIES FROM THEIR ASSET PORTFOLIOS IN A LIQUIDITY CRISIS.

Here we are attempting to test the theory of asset portfolio policies of commercial banks and to determine whether Regulation Q-induced losses of bank time deposits will lead to sales of these assets as banks are forced by the magnitude of deposit losses to reach far down on their list of liquidity resources.

Methodology: Hypothesis I

The Statistical Test

The test of this hypothesis will consist of ordinary least squares (OLS) multiple regression analysis performed on the University of Florida-NASA IBM 360 computer using the Regression Analysis Program for Economists (RAPE) designed and written by William J. Raduchel of Harvard University. The level of bank time deposits will be regressed on total financial asset holdings of household, businesses, municipal governments, and the foreign sector, on interest rates paid on total member bank time and savings deposits; on Treasury Bill rates; on savings and loan association rates; on mutual savings bank rates, and on Regulation Q ceiling rates.

If time deposits at commercial banks are interest sensitive, we would expect statistically significant regression coefficients for the interest rate variables in the model.

The statistical test for each of the rate variables in Hypothesis I is as follows:

$$H_o: \ B_i = 0$$

$$H_a: \ B_i \neq 0$$

where the test statistic is

$$t = \frac{\bar{B}_i - 0}{s\sqrt{n}} \quad ,$$

where the rejection region for the test is

$$t_{.05} \geq 1.960 \qquad \text{or}$$

$$t_{.01} \geq 2.326$$

and where H_o is the null hypothesis,

H_a is the alternative hypothesis,

B_i are the regression coefficients,

$\bar{B}_i$ are the estimated regression coefficients,

s are the standard errors of the regression coefficients in the equation,

n is the sample size, and

t is the Student-t value.

More importantly, we would like to be able to show that the interest rate coefficients we obtain are of operational or practical significance. Here we will look at the coefficient of determination for the OLS equation which indicates the amount of variance in the dependent variable explained by the independent variables. We will require that this statistic be equal to or greater than 50 percent. It is believed that lesser "fits" would render individual interest rate sensitivities (measured by the interest rate regression coefficients) of little value to us practically.

The Sample

The data used for testing this hypothesis have been gathered from numerous sources. As the dependent variable, we use total time and savings deposits at all domestic commercial banks, reported on a seasonally adjusted monthly basis, from July, 1961 through June, 1970 (7). The volume of total financial assets of households, incorporated and unincorporated nonfinancial business, municipal governments, and the foreign sector--believed to include all sectors which hold bank time deposits among their financial assets--serve as our first independent variable. This series is taken from data reported on a seasonally adjusted quarterly basis which we have interpolated to a monthly basis for the same time period (8).

The interest rate data used for this test are: average interest rates paid on time and savings deposits of Federal Reserve member banks (9); U.S. Treasury Bill three-month market yields (10); average interest rates paid on insured savings and loan association shares (11); average interest rates paid on insured mutual savings bank deposits (12); and weighted average Regulation Q ceiling rates (13). All these series are monthly observations from July, 1961 through June, 1970.

Methodology: Hypothesis II

The Statistical Test

Here again we use Raduchel's RAPE program to generate OLS estimates of commercial bank liquidity ratios for the period mid-1961 through mid-1970.

If we get a statistically significant equation for bank liquidity ratios which is also of practical importance to us* we can then look for a coincidence of observed liquidity ratios during the period which are significantly below predicted ratios and periods when Regulation Q was operative or banks lost time deposits. While causality is difficult to prove in economics, a high coincidence of these dates would tend to indicate that losses of time deposits are causally related to serious deviations from expected liquidity ratios.

---

*Practical significance again means a coefficient of determination of 50 percent or above.

Since we are interested here in observed values of our dependent variable in relationship to expected or predicted values of the variable (generated by the OLS equation), we are more concerned with finding a good predictive device than we are in determining the value of each independent variable's contribution to the regression explanation. Hence we will be concerned with the predictive ability of the equation--shown to us by the value of the coefficient of determination and by the equation's F value--and not with the beta or regression coefficients. This is an important conclusion because it implies that we need not be overly concerned with the degree of multicollinearity among the explanatory variables.

The statistical test for the second hypothesis is then:

$$H_O\colon\ F = 0$$

$$H_a\colon\ F \neq 0$$

where the test statistic is

$$F = \frac{s_D^2}{s_I^2}$$

with (k-1) degrees of freedom

with (n-k) degrees of freedom,

where H_O is the null hypothesis,

H_a is the alternative hypothesis,

s_D^2 is the predicted variance of the dependent variable,

s_I^2 is the predicted variance of the independent variables,

F is the inverted beta distribution,

k is the number of regressors, and

n is the number of observations (the sample size),

and where the rejection region for the test is

$$F_{.05} \geq 2.68 \text{ (maximum, depending upon equation)}$$

$$F_{.01} \geq 3.95 \text{ (maximum, depending upon equation)}.$$

If the F ratios and the equation's coefficient of determination indicate that the function specified is explaining an amount of variation in the dependent variable (bank liquidity ratios) which is not only statistically different than zero but also of practical importance, we can then examine those observed bank liquidity ratios which were not accurately predicted by the equation, i.e., were more than two standard deviations from the expected value, and compare these times with periods when Regulation Q was operative or banks lost time deposits.

The Sample

The data for testing this hypothesis have been gathered from the Federal Reserve Bulletin and from Federal Deposit Insurance Corporation Annual Reports for the years under study. We will use liquid assets of insured commercial banks (14) divided by total assets of these banks (15) as our dependent variable. Among our independent variables are: time deposits at insured commercial banks (16); all deposits at insured commercial banks (17); net worth of insured commercial banks (18); total loans of insured commercial banks (19); average interest rates charged on short term business loans at member banks (20); U.S. Treasury Bond three-five year market yields (21); and three month U.S. Treasury Bill rates (22).

Methodology: Hypothesis III

The Statistical Test

We are looking here for periods when commercial banks collectively sold municipal securities from their portfolios, especially when we would not have expected such sales on the basis of the relative yields on these instruments and on the growth rates of total bank assets. Sales of municipals under such conditions particularly when they coincide with periods of restrictive Regulation Q ceilings would tend to indicate that banks were under reasonably serious liquidity pressures because of deposit withdrawals.

We again employ an OLS regression equation to generate expected holdings of municipals at commercial banks, using bank municipal securities as the dependent variable and total bank assets, the interest yield on municipal securities, and the interest yield on three-five year U.S. Treasury Bonds as the independent variables.

Here as in Hypothesis II we are primarily concerned with developing a good prediction equation and so will concentrate on the F value for the equation. Specifically, the test statistic for this hypothesis is.

$$H_0\colon\ F = 0$$

$$H_a\colon\ F \neq 0$$

where the test statistic is

$$F = \frac{s_D^2}{s_I^2} \quad \begin{array}{l} \text{(with (k-1) degrees of freedom)} \\ \text{(with (n-k) degrees of freedom)} \end{array}$$

where H_o is the null hypothesis,

H_a is the alternative hypothesis,

s_D^2 is the predicted variance of the dependent variable,

s_I^2 is the predicted variance of the independent variables,

F is the inverted beta distribution,

k is the number of regressors,

n is the number of observations,

and where the rejection region for the test is

$F_{.05} \geq 3.10$ (maximum, depending upon equation)

$F_{.01} \geq 4.85$ (maximum, depending upon equation)

Not only do we require that the equation be statistically different from zero (indicated by the F-value) but again we maintain that the equation must be explaining

50 percent or more of the dependent variable's movement to be of practical importance to us.

The Sample

The sample for this regression equation consists of monthly observations, from July, 1961 through June, 1970, of the following: State and local government obligations held at all insured commercial banks (23), total assets of all insured commercial banks (24), the monthly average market yield on high-grade municipal securities (25); and the monthly average three five year U.S. Bond yield (26). Here again then we have 108 observations for our multiple regression program. We now proceed with the testing of this and our first two hypotheses.

NOTES

1. See Caroline H. Cagle, "Changes in Time and Savings Deposits, January-April 1970," *Federal Reserve Bulletin* (September, 1970), p. 683, text and footnote. In correspondence with Caroline Cagle, this lack of detailed information was further confirmed.

2 The figures for this ratio are reported at year end annually in Member Bank Income in the form of dollars of interest paid and average member bank time and savings deposits. See Appendix Table 1.

3. Since we did not have breakdowns of individual types of bank time and savings deposits on an accurate and consistent basis which corresponded to the breakdown of Regulation Q ceiling rates, we were forced to aggregate the levels of Q ceilings into a meaningful effective "weighted average Regulation Q" which could then be compared with total time and savings deposits. We gathered breakdowns of these deposits from various sources to generate the weights. See Appendix Table 2.

4. Because of the data availability problems we encountered and the way we had to generate the TD and MAX series, we know that they are not precisely accurate figures, that they are somewhat biased. In particular, we know that the absolute levels of these ratios are not precise since things like a 100 percent TD/MAX ratio recorded for December, 1961, seem intuitively implausible. We are primarily concerned with changes in these ratios however and here the bias is believed to be small and in any case does not seem to be systematic.

5. Lawrence S. Ritter, *Regulation Q: Issues and Alternatives* (Chicago: Association of Reserve City Bankers, 1965), p. 18.

6. See Caroline H. Cagle, "Changes in Time and Savings Deposits, January-April 1967," *Federal Reserve Bulletin* (July, 1967), pp. 1099-1103.

7. Taken from "Revision of the Money Stock," *Federal Reserve Bulletin* (December, 1970), pp 897-98.

8. See Appendix Table 3.

9. See Appendix Table 1.

10. From "Money Market Rates," Federal Reserve Bulletin, various issues.

11. See Appendix Table 4.

12. See Appendix Table 5.

13. See Appendix Table 2.

14. Interpolated from quarterly and annual figures, see Federal Deposit Insurance Corporation, Annual Report, 1961-1971.

15. Interpolated similarly from FDIC, Annual Report, 1961-1971.

16. Here we used interpolated FDIC figures for time deposit holdings instead of the Federal Reserve series in hopes of insuring compatability with the dependent variable. See FDIC, Annual Report, 1961-1971.

17. See FDIC, Annual Report, 1961-1971.

18. The net worth series included undivided profits plus reserves, see FDIC, Annual Report, 1961-1971.

19. See FDIC, Annual Report, 1961-1971.

20. See "Short-Term Business Loan Rates," Federal Reserve Bulletin, various issues.

21. See "Bond and Stock Yields," Federal Reserve Bulletin, various issues.

22. See "Money Market Rates," Federal Reserve Bulletin, various issues.

23. Observations from 1961-1968 are from FDIC, Annual Report, 1961-1971; for 1969-1970 from Federal Reserve Bulletin.

24. Ibid.

25. From "Bond and Stock Yields," Federal Reserve Bulletin, various issues.

26. Ibid.

CHAPTER VI

THE EMPIRICAL FINDINGS

Hypothesis I Interest Sensitivity of Time Deposits

At the onset, we were undecided about the appropriate way to specify our variables for the regression equation. We could use either the level of bank time deposits or the change in the level of bank time deposits as our dependent variable. Among the choices for independent variables were the simple series themselves, ratios of the series, lagged specifications of the series, or some combination of these. As an aid in this decision, we arbitrarily choose several of these alternatives in hopes of gaining some insight into what might be the most promising equations to pursue. The following four equations were the result:

$$
\begin{array}{llllll}
\text{TIME} = & -48.41 & +\ .2164(\text{TFA}) & -\ 3.173(\text{TD}) & -\ 4.988(\text{TB}) & -\ 131.5(\text{SLA}) \\
\text{s.e.} & (18.1) & (.01392) & (9.163) & (.7483) & (7.713) \\
t & (-2.680) & (15.551) & (-.346) & (-6.665) & (-17.054) \\
 & & & & & \\
 & +98.85(\text{MSB}) & +\ 1.550(\text{MAX}) & & & (1) \\
\text{s.e.} & (9.362) & (2.489) & & & \\
t & (10.559) & (.623) & & &
\end{array}
$$

$$\text{C.D.} = .9959 \quad \text{D.W.} = .33 \quad F=4080.26 \quad \text{Critical } F=2.99$$

AND,

```
TIME = +79.30 + .1538(LTFA)+ 50.58(LTD)- 5.041(LTD)
  s.e. (1.74)   (.01534)      (10.03)      (.8635)
   t   (45.658) (10.024)      (5.041)      (-5.838)

       -156.3(LSLA)+ 81.34(LMSB)  8.332(LMAX)              (2)
  s.e. (10.62)       (14.86)      (2.283)
   t   (-14.711)     (5.474)      (-3.650)

       C.D.= .9947   D.W.= .33   F=3125.479  Critical F=2.99
```

AND,

```
DTIME = -12.38 + .0617(DTFA)+ 6.819(TDTB)+ 5.637(TDSLA)
  s.e.  (6.78)   (.08651)      (1.194)      (8.710)
   t    (-1.826) (.711)        (5.709)      (0.647)

        +8.486(TDMSB)- 6.458(TDMAX)                        (3)
  s.e.  (14.14)         (2.597)
        (.600)          (-2.487)

        C.D.= .3248   D.W.= .85   F=9.719    Critical F=3.20
```

AND,

```
DTIME = .5253   .2270(LDTFA)+ 2.314(LTDTB)+ 14.83(LTDSLA)
  s.e.  (.579)  (.09376)       (.9052)       (6.734)
   t    (.907)  (-2.421)       (2.557)       (2.202)

        -12.83(LTDMSB)- 1.746(LTDMAX)                      (4)
  s.e.  (7.751)          (2.819)
   t    (-1.655          ( 0.619)

        C.D.= .1381   D.W.= .75   F=3.205    Critical F=3.20
```

where

TIME = total time and savings deposits at insured commercial banks,

TFA = total financial assets of households, nonfinancial business, municipal government, and foreign sectors,

TD = average interest rate paid on member bank time and savings deposits,

TB = U.S. Treasury Bill three month market yields,

MSB = average interest rate paid on insured mutual savings bank deposits, SLA = average interest rate paid on insured savings and loan association shares,

MAX = average Regulation Q ceiling rates,

LFTA = TFA, lagged three months (1),

LTD = TD, lagged three months,

LTB = TB, lagged three months,

LSLA = SLA, lagged three months,

LMSB = MSB, lagged three months,

LMAX = MAX, lagged three months,

DTIME = changes in TIME = TIME - TIME_{-1},

DTFA = changes in TFA = TFA - TFA_{-1},

TDTB = ratio of TD to TB = TD/TB,

TDSLA = ratio of TD to SLA = TD/SLA,

TDMSB = ratio of TD to MSB = TD/MSB,

TDMAX = ratio of TD to MAX = TD/MAX,

LDTFA = DTFA, lagged three months,

LTDTB = TDTB, lagged three months,

LTDSLA = TDSLA, lagged three months,

LTDMSB = TDMSB, lagged three months,

LTDMAX = TDMAX, lagged three months.

These equations have a number of problems, including incorrect signs, low coefficients of determination, positive autocorrelation among the error terms, and insignificant t-ratios for the correlation coefficients. Some of these we were able to correct, some were rather intractable.

These initial equations indicate to us that DTIME, the dependent variable in equations 3 and 4, tends to produce rather poor regression "fits" as indicated by the coefficients of determination of only 13.81 and 32.50 percent. While these equations were statistically different from zero--according to their respective F-ratios--they were not of practical use to us because of their low explanatory power. In a number of other experimental equations DTIME continued to exhibit this pattern and it was therefore decided to use TIME as the dependent variable for this hypothesis.

While our remaining equations, 1 and 2, have high coefficients of determination, they are plagued by other problems. The OLS model requires, among other things, that the error terms from observation to observation be independent. Specifically, the model requires that

$$E\ (e_t e_{t-s}) = 0$$

where t>s such that the disturbance term occurring at time t is not related to the disturbance term in time t-s. This is a problem common to time series data, and unfortunately is magnified the shorter the time span between observations. We have tended to aggravate the problem by using monthly rather than quarterly or yearly data.

Whenever autocorrelation is present in any major degree--and it is in equations 1 and 2 as indicated by the extremely low Durbin-Watson statistic--the least squares estimators are unbiased, consistent but inefficient.

The condition of asymptotic inefficiency implies that the calculated variances and thus also the standard errors of the estimators are either too large or too small Because we have positive autocorrelation here, the variances and the standard errors of the regression coefficients will be biased downward, inflating the t-ratios for these regressors. We know then that because the disturbances are autoregressive the conventional formulas for carrying out tests of significance or constructing confidence intervals with respect to the regression coefficients lead to incorrect statements" (2). Since we are interested in testing the statistical significance of the regression coefficients, we must find a method of eliminating the autocorrelation between observations.

We needed to get the D W statistic into an acceptable range in light of the following critical values.

TABLE VI-1: DURBIN-WATSON STATISTICS

	k=3		k=4		k=5	
	D_L	D_U	D_L	D_U	D_L	D_U
5.0%	1.61	1.74	1.59	1.76	1.57	1.78
2.5%	1.55	1.67	1.53	1.70	1.51	1.72
1.0%	1.48	1.60	1.46	1.63	1.44	1.65

n = 100 k = number of independent variables
D_L= lower value of D D_U= upper value of D

At the 1 percent level of significance our D W statistic for four regressors must be greater than 1.63 but less than 2.37 (4.00-1.63), for three regressors the D-W value must be greater than 1.60 but less than 2.40 (4.00-1.60), and so on. Values in these acceptable range do not necessarily indicate the absence of autocorrelation but suggest that an insignificant amount of "tracking" was occurring among the error terms (3).

One frequently suggested method of reducing autocorrelation is to specify the variables in terms of first differences. Since it appeared that equations 1 and 2 had rather large amounts of autoregression, it was felt that this simple technique would be of limited value to us but was tried anyway. Durbin-Watson statistics improved from their level of .33 to levels of .73, .80, and .89 for three equations tested--a clear reduction of serial correlation, but this technique generated results that were still unacceptable for our purposes.

A much more rigorous and successful autoregressive technique involving the iterative removal of autocorrelation (4) was applied to two new but similar equations, regressions 5 and 6 (5).

$$
\begin{array}{lllll}
\text{TIME} = & -2.543 & + .1580(\text{TFA}) & - 1.3197(\text{TDTB}) & - 18.370(\text{TDSLA}) \\
\text{s.e.} & (.753) & (.01691) & (1.964) & (40.91) \\
t & (3.379) & (9.344) & (-.672) & (-.449) \\
 & & & & \\
 & +.92164(\text{TDMAX}) & & & \qquad (5) \\
\text{s.e.} & (2.824) & & & \\
t & (.326) & & &
\end{array}
$$

$$\text{C.D.} = .5624 \quad \text{D.W.} = 1.73 \quad F=32.449 \quad \text{Critical } F=3.54$$

AND,

$$\begin{array}{lllll}
\text{TIME} = & -3.417 + & .17192(\text{TFA} - & 6.5722(\text{TD}) + & .42942(\text{TB}) \\
\quad \text{s.e.} & (.825) & (.03383) & (11.35) & (.3915) \\
\quad \text{t} & (-4.140) & (5.081) & (-.579) & (1.097) \\
 & +1.1015(\text{SLA}) & & & \qquad (6) \\
\quad \text{s.e} & (10.70) & & & \\
\quad \text{t} & (.103) & & &
\end{array}$$

C.D.= .6126   D.W.= 2.03   F=39.531   Critical F=3.94

We have apparently eliminated the positive autocorrelation which was present in our original equations since the D-W statistic for both equations now falls in the acceptable range (more importantly, the amount of remaining serial correlation in these equations was shown to be insignificant in the subsidiary equations for this autoregressive process). Both equations are also statistically and practically significant.

There however our success seems to stop. The reader will note that every single one of our interest rate variables has an insignificant regression coefficient and an incorrect sign. Theoretically we would have expected that as the level of TD rates, the TDTB, and TDSLA ratios increase, time deposits would tend to grow not to shrink as indicated by the negative signs here, and that as TB rates, SLA rates, and the TDMAX ratio increase that time deposits would tend to slow down or decrease not to grow as indicated by the positive signs in both equations. Furthermore, it seems inconsistent that we should have highly significant equations and yet have only one of the independent variables showing any significance at all in this explanation!

There is a term for this seemingly paradoxical behavior and its name is multicollinearity. One of the requirements of the classical normal linear regression model is that there exists no exact linear relationship between any of the explanatory variables. Multicollinearity, which has no "test" per se but which exists to some degree in all multiple regression equations, is the presence of systematic variance among the regressors. Multicollinearity is the cancer of econometric models: once you have it you tend to keep it. It can be isolated and kept from spreading by careful specification of the independent variables, but it has no lasting cure.

The damage attributable to multicollinearity is unfortunately important to us here. If it exists in our equations in high degrees, which we suspect, we can place no confidence in the individual regression coefficients of our variables and this is precisely what we need to be able to do if we are to test the hypothesis of bank time deposit interest-sensitivity. We need to try to measure, locate, and reduce the levels of multicollinearity in equations 5 and 6.

The location and severity of multicollinearity can be ascertained using the variance-covariance matrix (wherein regressors which are not truly independent of each other have high covariances), the determinant of the correlation matrix, or the correlation matrix itself (which relates each supposedly independent variable to each other independent variable). RAPE provides us with a measure of the degree of multicollinearity [(6)] for the whole equation in the form of the correlation matrix determinant [(7)] wherein a high determinant value indicates a low degree of dependence among the regressors and a low determinant value indicates significant amounts of multicollinearity between any two or all of the explanatory variables. Equation 5 had a correlation matrix determinant of .637051; equation 6 a value of .062672 On this basis, it appears that while both of these regression equations are being affected by multicollinearity, the degree is much higher in equation 6--the simple interest rate form of our relationship.

The correlation matrices for these two equations were generated by our program [(8)] and are reproduced in Table VI-2. The correlation coefficients of those variables which show significant collinearity are singled out in the matrices. In equation 6, where bank time deposits are hypothesized to be a function of the level of TFA, time deposit rates paid, and rates paid on representative competing financial claims, we find a serious multicollinearity problem. TFA and TD rates are highly collinear (.9130), TFA and SLA rates are highly collinear (.7756), and so too are TD and SLA rates (.7428). We have then three out of the four independent variables which are not very independent at all.

TABLE VI-2: CORRELATION MATRICES

Equation 5

	TFA	TDTB	TDSLA	TDMAX
TFA	1.0000	-0.0949	0.5800*	0.0503
TDTB	-0.0949	1.0000	-0.0177	0.1275
TDSLA	0.5800*	-0.0177	1.0000	-0.0434
TDMAX	0.0503	0.1275	-0.0434	1.0000

Equation 6

	TFA	TD	TB	SLA
TFA	1.0000	0.9130*	0.1552	0.7756*
TD	0.9130*	1.0000	0.0970	0.7428*
TB	0.1552	0.0970	1.0000	0.0884
SLA	0.7756*	0.7428*	0.0884	1.0000

The next step is to find a way to reduce the degree of multicollinearity. Unfortunately this is difficult if not impossible to do for two reasons. The first method available to reduce this interdependence involves enlarging the sample size. In most statistical sampling models, the largest possible sample was collected and surveyed in the original equations and so this method offers slim hope to the researcher. The other suggested way to reduce multicollinearity is to eliminate one of the two (or more) variables which show high degrees of dependence over the sample. Frequently this method renders the equation meaningless or insignificant however, because in spite of the fact that some of the information added by each regressor is redundant, there is usually an important amount of independent explanatory power even in collinear variables. Eliminating one or more of these variables often does serious damage to the power of the equation. Because we chose the widest range of dates acceptable to our hypothesis and initially included as many regressors as were generally available, we have only the second avenue to follow.

As we inspect the correlation matrices for equations 5 and 6, it appears that equation 5 offers us more chance for reducing multicollinearity without rendering the function totally insignificant. We note that TFA and TDSLA are the only important sources of this bias and hence we need only eliminate one of the two from the equation. Because our hypothesis is centered on the measuring of time deposit interest-sensitivity, we chose to eliminate TFA. Respecifying equation 5 we generated the following results:

$$\begin{array}{lllllll} \text{TIME} = & -377.4 & 3.0981(\text{TDTB}) + & 468.30(\text{TDSLA}) + & 121.51(\text{TDMAX}) & \\ \text{s.e.} & (21.1) & (6.909) & (15.47) & (17.96) & \\ t & (-17.917) & (-.448) & (30.281) & (6.767) & (7) \end{array}$$

$$\text{C.D.} = .9776 \quad \text{D.W.} = .24 \quad F=1511.465 \quad \text{Critical } F=4.01$$

which upon removal of the autocorrelation, again using the iterative process, we obtained

$$\begin{array}{lllllll} \text{TIME} = & -13.92 & 4.4661(\text{TDTB}) + & 455.97(\text{TDSLA}) + & 5.9421(\text{TDMAX}) & \\ \text{s.e.} & (1.53) & (3.252) & (30.44) & (4.734) & \\ t & (-9.117) & (-1.373) & (14.979) & (1.255) & (8) \end{array}$$

$$\text{C.D.} = .7039 \quad \text{D.W.} = 1.74 \quad F=80.823 \quad \text{Critical } F=4.01$$

In examining the results of equation 8, we found that the determinant of the correlation matrix was .958392, indicating that we have only small remaining amounts of multicollinearity. We should then be able to apply our test statistic to this equation.

In assessing whether any of our independent variables are statistically different than zero, we applied the Student's-t distribution to the t values for our regressors. On this basis, it appears that only the level of time deposit rates versus savings and loan association rates importantly affected the growth of time deposits at commercial banks for this ten-year period. Neither the unregulated rate on Treasury Bills nor the level of Regulation Q ceilings appear to have had any major part in explaining the level of time deposits.

The reader will remember that we asserted Regulation Q was operative in two periods, the last three months of 1966 and from the end of 1968 until the end of our study in June, 1970. Upon examination of the observed values of bank time deposits for the years covered in this study, we noted that banks experienced actual time deposit losses in the following months: October and November, 1966, January through November, 1969, and in January, 1970. These latter dates coincide almost exactly with periods of restrictive Regulation Q ceilings. Such a high coincidence would tend to indicate that these were not chance or random occurrences, and yet, equation 8 seriously overpredicted* levels of actual bank time deposits in four months: March, 1961; March, 1965; July, 1969; and January, 1970. Only the last two of these dates correspond with times when Regulation Q was operative (according to our standards) and when banks actually experienced time deposit runoffs. We are forced to conclude that our hypothesis was only partially substantiated

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*By two standard deviations, or by two times the standard error of the estimate.

Hypothesis II: Liquidity Crises at Commercial Banks

An alternative way to test the inhibitory power of restrictive levels of Regulation Q ceilings is to examine observed liquidity ratios for commercial banks over time versus expected liquidity ratios for the same time period Significant deviations from predicted liquidity standards at banks, where they occur in high coincidence with operative periods of Regulation Q ceilings, would also tend to indicate the ability of this monetary tool to cause losses of time deposits at these institutions. We need then a reliable and useful prediction equation for bank liquidity ratios. Two initial estimations were made:

$$
\begin{array}{lllll}
LA = & 5.041 + & .091125(TA) - & .15526(TD) + & .15970(AD) \\
\text{s.e.} & (3.55) & (.06221) & (.06519) & (.07049) \\
t & (1.420) & (1.465) & (-2.382) & (2.266) \\
 & & & & \\
 & -1.6807(NW) - & .17432(LO) + & .85851(ILO) & \\
\text{s.e.} & (.7752) & (.05025) & (.6926) & \\
t & (-2.168) & (-3.469) & (1.240) & \\
 & & & & \\
 & +.24798(ITBD) - & 1.2343(ITB) & & \\
\text{s.e.} & (.6257) & (.5433) & & \\
t & (.3963) & (-2.272) & &
\end{array}
\tag{9}
$$

C.D.= .5025 D.W.= .20 F=12.498 Critical F=2.71

AND,

$$\begin{array}{lllll}
\text{LATA} = & .2545 & - .000020844(\text{TA}) & - .19579(\text{TDAD}) & 1.8939(\text{NWAD}, \\
\text{s.e.} & (.0270 & (.00001436) & (.05127) & (.5107) \\
t & (9.415) & (-1.452) & (-3.819) & (-3.709) \\
 & & & & \\
 & -.13018(\text{LOTA}) & - 011708(\text{ILOITBD}) & + .018987(\text{ILOITB}) & (10) \\
\text{s.e.} & (.06205) & (.006726) & (.004110) & \\
t & (-2.098) & (-1.741) & (4.619) &
\end{array}$$

C.D.= .9399   D.W.= .28   F=263.035   Critical F=3.01

where

LA = liquid assets (cash plus U.S. Government securities of one year or less) at insured commercial banks,

TA = total assets at insured commercial banks,

TD = time and savings deposits at insured commercial banks,

AD = time and savings deposits and demand deposits at insured commercial banks,

NW = net worth at insured commercial banks,

LO = total loans at insured commercial banks,

ILO = average interest rate charged on short-term business loans at member banks,

ITBD = average monthly market yield on 3-5 year U.S. Treasury Bonds,

ITB = average monthly market yield on 3-month U.S Treasury Bills,

LATA = liquidity ratios at insured commercial banks = LA/TA,

TDAD = measure of deposit volatility = TD/AD,

NWAD = measure of capital adequacy = NW/AD,

LOTA = measure of riskiness of asset portfolio = LO/TA,

ILOITBD = measure of profitability of paring liquidity ratio = ILO/ITBD, ILOITB = measure of profitability of paring liquidity ratio = ILO/ITB.

Equation 10 is clearly superior to equation 9 and was pursued further. After eliminating two seemingly insignificant variables from this equation (9), the following results were obtained:

$$\begin{array}{lllll}
\text{LATA} = & .2466 & - .25703(\text{TDAD}) & - 2.3287(\text{NWAD}) & - .085267(\text{LOTA}) \\
\text{s.e.} & (.0234) & (.03624) & (.3964) & (.05912) \\
\text{t} & (10.549) & (-7.092) & (-5.874) & (-1.442) \\
 & & & & \\
 & +.017251(\text{ILOITB}) & & & \qquad (11) \\
\text{s.e.} & (.003881) & & & \\
\text{t} & (4.445) & & &
\end{array}$$

$$\text{C.D.} = .9371 \quad \text{D.W.} = .30 \quad F=383.760 \quad \text{Critical } F=3.54$$

Equation 11 does not appear to have been harmed significantly by its respecification from equation 10. In fact the Durbin-Watson statistic indicates that we have marginally less autocorrelation in equation 11 than in 10 and we note that the significance of the equation has improved--both at the expense of only .28 of a percent in explanatory power. After removal of the autocorrelation among the error terms in equation 11 (indicated by the Durbin-Watson statistic of .30), the results were:

$$\begin{array}{lllll}
\text{LATA} = & .002545 & - .06758(\text{TDAD}) & + 3.6814(\text{NWAD}) & - .10713(\text{LOTA}) \\
\text{s.e.} & (.00165) & (.08576) & (.6475) & (.1525) \\
\text{t} & (1.544) & (-.788) & (5.685) & (-.702) \\
 & & & & \\
 & +.00074445(\text{ILOITB}) & & & \qquad (12) \\
\text{s.e.} & (.001144) & & & \\
\text{t} & (.651) & & &
\end{array}$$

$$\text{C.D.} = .2727 \quad \text{D.W.} = 1.74 \quad F=9.374 \quad \text{Critical } F=3.54$$

The reader will note that NWAD (the capital adequacy proxy), LOTA (the asset portfolio risk measure), and ILOITB (the profitability of paring liquidity resources proxy) all have theoretically incorrect signs. Further, the TDAD (the volatility of deposit proxy), LOTA, and ILOITB variables all appear to be insignificant at both the 5 percent and the 1 percent levels. We thus suspect a high degree of multicollinearity among some of these variables.

Our work here is not specifically designed to test the significance of individual factors affecting bank liquidity ratios (although this type of research easily lends itself to explorations along these lines) and consequently the presence of a large degree of multicollinearity is relatively unimportant to us.

The apparent interdependence among our regressors does however suggest that we might be able to improve our fit by adding or eliminating certain explanatory variables from the equation. Results of a number of attempts along these lines were unsuccessful, generating only less powerful explanations than we have in equation 12.

Despite the rather low explanatory power of our last equation, the regression is still significantly different than zero and contains an unbiased standard error of the estimate. We decided therefore to go ahead with our examination of statistically deviant values of the liquidity ratio.

The standard error of the estimate for equation 12 was .0009914. We earlier suggested that any value which fell above or below the expected values for any period by two times (actually 1.960) this amount could reasonably* be said to have been caused by factors not included in the prediction. Since the level of bank time deposits was specified only in relationship to the level of total deposits, we suggest that losses of bank time deposits are not truly represented in the regression equation and would be one possible explanation for a significantly lower than expected bank liquidity ratio.

Upon inspection of the predicted and actual bank liquidity ratios and the difference between the two, the following dates were pinpointed as meeting the two standard deviation error criteria: October, 1961; January, 1962; April, 1962; October, 1962; January, 1963; and July, 1964. The October, 1961, April, 1962, and January, 1963, figures indicated that actual liquidity ratios had been significantly lower than predicted and each showed a large decline from the previous month's ratio. The January, 1962, October, 1962, and July, 1964, figures indicated a significantly higher than expected liquidity ratio for banks and each also indicated a rather large change from the ratio in the previous period.

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*With only a 5 percent probability that the deviant value was due to strictly random variance.

We found no significant deviances of expected liquidity ratios after the middle of 1964 and obviously then none in periods when Regulation Q was operative (October-December, 1966, and December, 1968-June, 1970) or when banks actually experienced losses of time deposits (October and November, 1966, and from January, 1969, through January, 1970). While we are at a loss to explain the three under and three over predictions of our regression equation--other than through pure chance* we have found no evidence to substantiate our hypothesis of commercial bank liquidity crises precipitated by the restrictive use of Regulation Q.

Hypothesis III: Bank Sales of Municipals

While our effort to statistically link a restrictive level of Regulation Q with either losses of bank time deposits or liquidity crises (as we have defined them) via multiple regression explanation has been unsuccessful so far, we have one more area to investigate. During periods when Regulation Q effectively prohibited interest rate competition at banks, these institutions might have experienced deposit losses to the point where normal liquidity resources were insufficient to cover the drains. Banks might then have been forced into selling part of their investment portfolio.

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*With $\alpha = 5$ percent, we would expect 5.25 observations to be outside two standard deviations of the mean by pure randomness.

We are particularly interested in sales of municipal securities from the asset portfolio of commercial banks, and as we inspected this series for the years in our study, we discovered that bank holdings of these investments fell in the following months: July-December, 1969. Since this period coincided with part of the period in which Regulation Q was operative, we had strong but unsubstantiated evidence that the two phenomena were linked together. We needed to determine whether such sales could have been predicted from the relative yields on municipal securities and from the level of total bank assets.

If bank holdings of State and local government securities are related to these phenomena, are not considered part of the liquidity reserve of banks under normal conditions, would not have been sold from banks' asset portfolios in 1969 unless factors other than their relative yields and the growth of bank assets were influencing them, then such sales as did occur could be attributed to unexpected or nonroutine factors. One of those factors would surely be extreme cash needs of banks resulting from losses of time deposits.

Our initial regression equations, relating municipals in the bank portfolio to the size of total bank assets, to market yields on these instruments, and to competing market yields, generated the following results:

$$\begin{array}{llll} MPL = & -19.20 + & .15227(TA) - & .051038(DIFF) \\ \text{s.e.} & (.470) & (.001754) & (.3941) \\ t & (-40.32) & (87.08) & (-.129) \end{array} \qquad (13)$$

$$C.D = .9946 \quad D.W. = .12 \quad F = 9695.324 \quad \text{Critical } F = 4.85$$

AND,

$$\begin{array}{llll} MPL = & -16.31 + & .15159(TA) - & 2.9810(RATIO) \\ \text{s.e.} & (1.69) & (.001221) & (1.694) \\ t & (-9.669) & (124.144) & (-1.760) \end{array} \qquad (14)$$

$$C.D = .9948 \quad D.W. = .13 \quad F = 9981.375 \quad \text{Critical } F = 4.85$$

AND,

$$\begin{array}{lllll} MPL = & -19.45 + & .16323(TA) - & .82732(ITBD) + & .053463(IMPL) \\ \text{s.e.} & (.450) & (.00310) & (.4174) & (.3690) \\ t & (-43.211) & (52.659) & (-1.982) & (.145) \end{array} \qquad (15)$$

$$C.D = .9953 \quad D.W. = .16 \quad F = 7381.559 \quad \text{Critical } F = 4.01$$

where

MPL = municipal securities at insured commercial banks,

TA = total assets at insured commercial banks,

ITBD = market yield on three-five year U.S. Treasury Bonds,

IMPL = market yield on high-grade municipal securities,

DIFF = the difference in Treasury Bond and municipal yields = ITBD-IMPL, and

RATIO = the ratio of municipal to Treasury Bond yields = IMPL/ITBD.

We have an obvious autocorrelation problem in these equations, but the existence of their high explanatory power (indicated by both the F-values and the coefficients of determination) indicate that we should pursue all of them further. After two rounds of the autoregressive Cochrane Orcutt method for removal of serial correlation, we generated the following results:

```
MPL = .09428 + .097853(TA)+ .10799(DIFF)                    (16)
 s.e. (.0788)  (.009696)     (.1468)
  t   (1.197)  (10.092)      (.735)

      C.D.= .4974   D.W.= 1.49   F=50.965   Critical F=4.85
```

AND,

```
MPL = .1449 + .090548(TA)- .42121(RATIO)                    (17)
 s.e. (.0724) (.01011)      (.8563)
  t   (2.002) (8.956)       (-.492)

      C.D.= .4385   D.W.= 1.55   F=40.216   Critical F=4.85
```

AND,

```
MPL =  .2617 + .057830(TA)- .15521(IMPL)+ .064304(ITBD)(18)
 s.e. (.0819)  (.004266)     (.1595)        (.1236)
  t   (-3.195) (13.557)      (-.973)        (.520)

      C.D.= .6534   D.W.= 2.13   F=64.102   Critical F=4.01
```

Comparing equations 16, 17, and 18 we see that the first two have dropped below our 50 percent explanatory criteria and still have significant amounts of autocorrelation. Further removal of autocorrelation would push the coefficient of determination even lower. Equation 18 however has a coefficient of determination of 65.34 percent and now has an acceptable Durbin-Watson statistic. This last equation then meets our tests of significance and we will examine it more carefully.

From Equation 18 we see that bank municipal holdings appear to be highly dependent upon levels of total bank assets, as we would expect. The t-ratios of municipal and Treasury Bonds seem to indicate very little influence of these variables on levels of bank owned municipals. We also note that the signs on the interest rate variables are theoretically incorrect and we again suspect multicollinearity to be the explanation. It seems intuitively logical that municipal and government bond yields are not truly independent but are both adding redundant information about the interaction of demands and supplies of funds in the open market. Since we are merely looking for a reasonably accurate and unbiased prediction equation--which we seem to have in equation 18--and are unconcerned with redundancy of explanatory power, we will proceed to identify deviant observed from expected values of the dependent variables generated by this last equation.

The standard error of the estimate of municipals held at commercial banks for equation 18 is .1867. Observed values fell more than two times this distance away from the mean value in the following months: January, 1962; January, 1963; March and April, 1965; July, 1969; and January, 1970. The January, 1962, January, 1963, April, 1965, and January, 1970, dates indicated that bank holdings of municipals were significantly higher than expected, while the March, 1965, and July, 1969, figures indicated a serious deficiency of actual bank holdings of these securities.

Only the 1969 overestimation of our equation corresponds to a period when we suggest that banks might have faced a serious liquidity crisis. For the months of July-December, 1969, when banks sold municipals, our data do indicate however that expected bank owned municipal securities were considerably higher than actual holdings, but the difference was not significant at the 5 percent level (i.e., actual bank holdings of municipals were not two standard deviations below expected levels). We conclude that while we were unable to prove a continuous and damaging effect from the restrictive use of Regulation Q in 1969, it appears that banks were forced to sell municipal securities to some extent when we would not have expected them to do so.

NOTES

1. A three month lag [illegible] chosen as it was the most commonly encountered [illegible] we found in the literature. A distributed lag function [illegible] considered for inclusion in these equations but was [illegible] on two counts. We were to find serious autocorrelation [illegible] in most of our equations and this condition is [illegible] impossible to deal with when combined with lagged [illegible] variables. (See Jan Kmenta, Elements of Econometrics [illegible] Macmillan Co., 1971), p. 295). Secondly, [illegible] the exploration and specification of this complex [illegible] transformation would have taken us too far afield [illegible] hypotheses. A distributed lag function would [illegible] of the multiple regression equation a[illegible] area which needs to be explored further in financial models.

2. Kmenta, p. 281.

3. See any advanced econometric text for a discussion of the harmful and [illegible] of autocorrelation.

4. This was the well known Cochrane Orcutt iterative process as presented in D. Cochrane and G. H. Orcutt, "Application of Least Squares [illegible] to Relationships Containing Autocorrelated [illegible]," Journal of the American Statistical Association ([illegible], 1949), pp. 32-61.

5. A number of exploratory equations were run, 20 to be exact, in efforts to find which variables yielded consistently correct signs and added independent and significant amounts of explanatory power to the equations. In this process, the mutual savings bank deposit rate series, no matter how specified, seemed to consistently generate the wrong sign, was often insignificant, was felt to be duplicative of the savings and loan association rate series which performed much more satisfactorily, and the former series was therefore eliminated from the final equations.

The maximum interest rate series showed mixed results and thus was included in equation 5 but not in 6 to see what this series was adding to our relationship.

Neither interest rate variable alone nor interest rate ratios showed any superior explanatory power over the other in the initial regressions. Both were felt to be important however and so two equations were specified, one with the interest rates themselves and the other with the rate ratios.

6. Along the lines suggested in Donald E. Farrar and Robert G. Glauber, "Multicollinearity in Regression Analysis: The Problem Revisited," The Review of Economics and Statistics (February, 1962), pp. 92-107.

7. The value of the determinant of the correlation matrix has a range from 0 to 1.00.

8. In the correlation matrix itself, the correlation coefficient will be zero for truly independent variables and will be 1 00 for perfectly correlated regressors. Our regression program also provides us with a correlation matrix for OLS equations.

9. The TA independent variable in the equation, a proxy for economies of age, was dropped since it seemed to be of no practical significance. The ILOITBD variable was also dropped as it did not appear to add significantly to the explanatory power of the whole equation and in any event was providing information apparently provided by the ILOITB variable.

CHAPTER VII

SUMMARY AND CONCLUSIONS

This study has taken a close look at an interesting and somewhat unique period of monetary history in the United State. Our work here was focused upon the Federal Reserve's recent restrictive usage of Regulation Q interest ceilings on time and savings deposits at commercial banks and what effects this recent administration has had on commercial bank portfolios.

After examining the history of Regulation Q within the Fed, we noted a number of criticisms born of its recent administration, and reviewed the literature surrounding these important controversial areas. The heart of our work here was the setting out and testing of three specific theories which seem to follow from the body of current research. We empirically examined the presence of interest rate responsiveness of time and savings deposits at commercial banks with a view to the role played therein by Regulation Q ceilings, the recent trend of bank liquidity preparedness versus losses of these deposits, and the place of municipal securities in the bank's asset portfolio with regard to deposit-loss precipitated liquidity needs. We conclude the following from the empirical results of our study:

1. Over the period of our study and over the sample surveyed, there appeared to be no significant correlation between the volume of bank time and savings deposits and either the ratio of rates paid on these deposits to competing open market rates (the latter represented by three month U. S. Treasury Bill rates), or the ratio of time deposit rates to Regulation Q ceiling rates (the latter represented by a weighted average Regulation Q ceiling rate series). There appeared to be an important and expected relationship between the volume of bank time and savings deposits and the ratio of rates paid on time deposits to rates paid on competing nonbank financial intermediary claims (represented by savings and loan association share rates of return). Thus only slim evidence exists to suggest that competing interest rates or interest rate ceilings have had a very important impact on time and savings deposits at commercial banks during the 1961-1970 period.

2. Commercial banks apparently had little difficulty in meeting the time deposit losses of October-December, 1966, and December, 1968-June, 1970 because our results indicated that in no month coinciding with these periods did commercial banks register a collective liquidity ratio significantly below what would have been predicted using ordinary liquidity determinants (measures of the volatility of the deposit portfolio, the bank's capital cushion, and the profitability of

reducing the liquidity ratio,. A drop in the level of liquid assets to total assets for banks over a monthly time interval (indicative of unexpected liquidity needs) of two standard deviations below the predicted liquidity ratio, would, to our mind, indicate a noteworthy bank liquidity problem approaching a liquidity crisis. No such declines were found during periods of commercial bank time deposit losses and we must therefore conclude that liquidity needs of banks never truly reached crisis conditions in 1966 or 1968-1970.
3. Finally, commercial banks were apparently not forced to sell part of their municipal security holdings to meet time deposit losses except in one month analyzed in the study, July, 1969. In all other periods of bank time deposit losses, liquid resources other than security sales appeared to be sufficient to meet banks liquidity needs, further denying support to the liquidity crisis theory of Regulation Q and bank time deposits.

In general, we found little or no support for our hypotheses, hypotheses which not only appear to be commonly accepted as valid among many economists today, but which seem to follow directly from the most current literature in the field. What can be the reasons for our findings? The source of the divergence of our findings from expected findings can come from one of two places: either our results are in fact valid and shed new if heretical light on the subject of bank time deposit and portfolio behavior, or our conclusions are erroneous.

If it is the case that our findings are incorrect the problem lies in one of the following areas: the statistical methods, the data, the theoretical specification of our theories, or the actual calculations. The statistical techniques used here may have introduced some problems. While the multiple regression technique of fitting a number of independent series to one set of dependent observations that we used is a common econometric device for specifying and identifying relationships among economic data, it is not without its complications and drawbacks. Particularly when dealing with nonstationary time series (i.e., those in which the mean of the dependent variable changes over time) the least squares method is hampered by several purely statistical biases, foremost of which is the serial correlation problem. After this bias has been removed by the most sophisticated and accurate methods developed to date, we are left with a least squares explanation that is substantially less powerful (in a statistical sense) than the original but asymptotically inefficient one. It seems surprising to us (and to many other economists as well*) that the simple elimination of a statistical bias among the error terms for the observations, the residual explanation of variance, renders a highly significant relationship almost meaningless --a phenomenon we encountered frequently in our research. This has to be regarded as the biggest problem we faced in our empirical investigations and more work must be done in this area before econometric methods are going to be truly useful to economists. Indeed, the low t-ratios and coefficients of determination for our final equations reflect this problem to some unmeasurable but, we feel, significant degree.

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*One new approach that attempts to deal with this problem is a random coefficient regression technique (RCR) developed by Professor Forehlich, formerly of the University of Minnesota.

The data used in our research were probably a source of some error. A number of the series used in our equations were incomplete over the 1961-1970 period and had to be completed via interpolation. Clearly, the figures generated by this method will not be the accurate ones. Further, we were forced to make some assumptions about some series, such as the weighted average Regulation Q series, which undoubtedly introduced additional error or deviance from true values for the series. It was felt, however, that the errors introduced here were quite small as the assumptions made were similar to assumptions found in most recent published studies of this type. This is not to say that we cannot use or do not need more complete and detailed bank data. The steps recently taken by bank supervisory agencies to correct this problem will no doubt improve future research findings.

Errors could also have been introduced through a theoretical misspecification of the true economic relationships underlying the dependent and independent variables. Here, the correct specification can only be determined through the trial and error method. Initially we set up the relationships based on the results of previous similar studies and along lines suggested by economic theory. Where these yielded poor results, a respecification was undertaken and was continued until all reasonable combinations had been tested. That relationship yielding the highest statistical performance should also be the best theoretical specification and this rule was followed in our study. We do not believe there were any final equation forms which contain biases due to variable misspecification that would have contributed importantly to the significance (or lack of it) of our results.

Finally, our results could be wrong because of purely mathematical manipulation errors. The data used in this study were collected from several different sources and were checked for accuracy on two different occasions before being given to the computer card punchers. The data were manually and machine checked in the computer card form. Little error should have been introduced here. Further, all calculations, even the simplest algabraic functions, were performed on the computer, using the canned Regression Analysis Program for Economists on disc at the University of Florida's IBM

360-65 computer, a program which has been professionally debugged for arithmetic errors. We conclude that errors of a purely mechanical nature should have contributed insignificantly to total error for the empirical part of this study.

Accordingly we know of no area in our testing procedures, other than in those associated with the data availability [illegible] econometric techniques mentioned above, which should render our results invalid within the statistical limits used for the tests. Indeed, we view the findings of our research with considerable confidence and suggest that they have generated results which should be of considerable interest to banking authorities, critics of monetary policy, and economists in general.

Suggestions for Future Research

Work in the area of bank time deposit interest rate sensitivity and liquidity standards and portfolio behavior must clearly continue. In our work here we uncovered several areas that apparently have been untouched by empirical studies (ours included) that, to our mind, need intensive investigation if we are to understand the nature and processes enveloped in the category we call financial behavior in this country. We need to study more closely particular categories of bank time deposits and how savers have reacted to changing interest returns on these deposits. This area of research will be significantly opened up by the improved data on individual types of time and savings deposits (starting in early 1970) available from the Fed and the FDIC call reports. Differences in the size and maturity of deposits seem to point toward differences in the functional position of these deposits in the portfolios of savers, especially with regard to their responsiveness to rates offered on these financial claims. We cannot continue to talk of commercial bank "time and savings deposits" as if they were a homogeneous class of instruments if we are to make accurate and economically desirable monetary policy decisions.

Another area of vital interest to economists and monetary authorities is bank liquidity behavior. This field is virtually untouched by empirical analysis and should be on the top of a list of important economic phenomena requiring rigorous investigation.

Furthermore, this study has ignored the question of the effect of interest rate ceilings on nonbank financial intermediary institutions, a question which became doubly important after 1966 with the proliferation of interest rate ceilings at other financial intermediaries accomplished by the passage of the Interest Rate Control Act of that year. A number of recent studies have just been finished that investigage this area, but most have their eye on one particular institution, the savings and loan association. We feel that more work should be done here, but with a broader view than either these recent works or our study. Comprehensive studies of the effects on liquidity and investment policies of all financial intermediaries affected by deposit interest rate ceilings seem to be in order now that broader authority for such ceilings has been in existence for almost seven years.

And finally, both mathematical economists and statisticians must continue to search for better models and techniques to describe the increasingly complex and cumbersome body of economic data being collected One group cannot or will not benefit econometric analysis without the aid, guidance, and encouragement of the other and greater cooperation among the practical and theoretical disciplines is the only route toward a fuller understanding of our economic system. That cooperation is now proceding largely on an ad hoc basis but we feel must be recognized for its worth, formalized, and organized into functional study units giving tools to the economists and substance to the mathematicians.

APPENDIX

APPENDIX TABLE 1 INTEREST RATES PAID ON MEMBER BANK TIME AND SAVINGS DEPOSITS, 1961-1970
(in percent)

DATE	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
January	--	2.68	3.02	3.29	3.42	3.62	3.95	4.23	4.46	4.61	4.84
February	--	2.69	3.06	3.30	3.43	3.64	3.98	4.25	4.48	4.62	4.87
March	--	2.70	3.11	3.31	3.44	3.67	4.01	4.27	4.50	4.63	4.89
April		2.71	3.15	3.32	3.45	3.69	4.04	4.28	4.52	4.63	4.92
May		2.72	3.19	3.33	3.46	3.71	4.07	4.30	4.54	4.64	4.95
June	2.61	2.73	3.23	3.34	3.47	3.73	4.11	4.32	4.56	4.65	4.98
July	2.62	2.77	3.24	3.35	3.49	3.76	4.13	4.34	4.57	4.68	--
August	2.63	2.81	3.25	3.36	3.51	3.80	4.14	4.36	4.57	4.71	--
September	2.64	2.85	3.25	3.37	3.53	3.83	4.16	4.38	4.58	4.73	
October	2.65	2.90	3.26	3.38	3.55	3.86	4.18	4.40	4.59	4.76	
November	2.66	2.94	3.27	3.39	3.58	3.89	4.20	4.42	4.60	4.79	--
December	2.67	2.98	3.28	3.41	3.60	3.92	4.21	4.44	4.61	4.81	--

Source The June figures are the yearly averages of interest rates paid on all time and savings deposits held at member banks (see "Member Bank Income," *Federal Reserve Bulletin*, various issues between 1960 and 1971). The interest rates from July of one year to May of the next are even interpolations of the difference between the average interest rate paid for one year and the next

APPENDIX TABLE 2A REG[illegible] [illegible] Q CEIL[illegible] RAT[illegible] [illegible] AND [illegible] DEPOSITS, BY [illegible] OF [illegible], 19[illegible]

TYPE DEPOSIT/DATE[b]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9	[illegible]	[illegible]
[a]SD 1 12 Mo	3 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[a]SD, Ov r 12 Mo	3 00	4 [illegible]	4 [illegible]	[illegible] 70	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]
[b]MMTD 1-3 Mo	1 [illegible]	1 [illegible]	[illegible]	4	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]
[b]MMTD 3 6 Mo	[illegible] 50	[illegible]	4 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5 [illegible]	[illegible] 25
[b]MMTD 6 12 Mo	3 00	3 [illegible]	4 00	4 50	5 [illegible]	[illegible]	5 00	[illegible]	5 00	5 00	31 00
[b]MMTD 1 2 Yr	3 00	4 00	4 00	4 50	5 50	5 00	5 00	5 00	5 00	5 50	1[illegible] 00
[b]MMTD, Over 2 Yr	3 00	4 00	4 00	4 50	5 5[illegible]	[illegible] 00	5 00	5 00	5 00	5 5[illegible]	5 50
[c]SMTD 1 3 Mo	[illegible] 00	1 01	[illegible]	4 00	5 [illegible]	[illegible]	5 [illegible]	5 00	[illegible]	5 0[illegible]	[illegible] 25
[c]SMTD 3-6 Mo	2 50	3 [illegible]	4 [illegible]	4 50	5 5[illegible]	[illegible]	[illegible]	5 0[illegible]	5 00	5 00	[illegible] 25
[c]SMTD 6 12 Mo	3 00	3 5[illegible]	4 00	4 50	5 [illegible]	5 [illegible]0	[illegible] 00	5 0[illegible]	5 [illegible]0	5 00	11 00
[c]SMTD, 1 2 Yr	3 00	4 00	4 00	4 50	5 5[illegible]	5 [illegible]0	5 00	5 00	5 50	5 50	1[illegible] 00
[c]SMTD, Over 2 Yr	3 00	[illegible] 00	4 [illegible]	4 50	5 [illegible]	5 [illegible]	[illegible]	5 [illegible]	5 [illegible]5	5.75	5.50
[d]MMTD, 1 2 Mo	1 0[illegible]	1 0[illegible]	1 00	4 0	5 50	5 50	5 5[illegible]	5 50	6 [illegible]5	6 25	5 00
[d]SMTD, 1-3 Mo	1 00	1 00	1 00	4 00	5 50	5 50	5 [illegible]0	5 75	6 50	6 50	5 00
[d]SMTD, 3-6 Mo	2 50	2 50	4 00	4 50	5 50	5 50	5 50	6 00	6 75	6 75	10 00
[d]SMTD, 6 12 Mo	3 00	[illegible]	4 [illegible]	4 50	5 [illegible]	5 50	[illegible]0	[illegible]5	7 00	7 00	65 00
[d]SMTD, Over 12 Mo	3 00	4.00	4.00	4 50	5.50	5.50	[illegible]	[illegible]	7.5[illegible]	7.50	15.00
[e]Avg Q on SD's	3 00	3 75	3 75	4 00	4 [illegible]	4 [illegible]	4 [illegible]	4 50	4 50	4 50	
[f]Avg Q on Small TD's	2 94	3 56	3 72	4 49	5 50	5 24	4 99	4 99	5 09	5 17	
[g]Avg Q on Large TD's						5.[illegible]0	[illegible]0	6 16	6.99	6.99	

Source Regulation Q ceilings given in columns 1 10 are from *Federal Reserve Bulletin*

[a] Savings deposits all denominations

[b] Multiple maturity time deposits, all denominations

[c] Single maturity time deposits, less than $100 000

[d] Single maturity time deposits more than $100,000

[e] We assume from statements taken from various Federal Reserve publications, that about one half of total savings deposits are held for less than one year and one half for more than one year

APPENDIX TABLE 2A (continued)

[illegible]

See last column

3--July 17, 1963.

6--July 20, 1966.

10--February 26, 1970

[illegible]

[illegible] classification

[illegible] deposits [illegible] deposits each add to [illegible]

APPENDIX TABLE 28 WEIGHTED AVERAGE REGULATION Q EFFECTIVE CEILING RATES ON MEMBER BANK TIME AND SAVINGS DEPOSITS 1961-1970

		In Billions of Dollars				In Percent				
DATE	TSD[a]	SD[b]	LTD[c]	SD[d] / TSD	STD[e] / TSD	LTD[f] / TSD	MAX[g] / SD	MAX[h] / STD	MAX[i] / LTD	AVG[k] / MAX
J	---	---	---	78.5	21.5		3.00	2.94		2.99
A	---	---	---	77.4	22.6		3.00	2.94		2.99
S	---	---	---	76.3	23.7		3.00	2.94		2.98
61 O	---	---	---	76.6	23.4		3.00	2.94		2.98
N	---	---	---	76.9	23.1		3.00	2.94		2.98
D	67,460*	51,595*	---	77.1	22.9		3.00	2.94		2.98
J	68,511	52,510		76.6	23.4		3.75	3.58		3.71
F	69,562	53,036	---	76.2	23.8		3.75	3.58		3.71
M	70,613	53,562	---	75.8	24.2		3.75	3.58		3.71
A	71,664	54,088	---	75.5	24.5		3.75	3.58		3.71
M	72,715	54,614	---	75.1	24.9		3.75	3.58		3.71
62 J	73,767	55,140	---	74.7	25.3		3.75	3.58		3.71
J	74,818	55,666	---	74.4	25.6		3.75	3.58		3.71
A	75,869	56,192	---	74.1	25.9		3.75	3.58		3.71
S	76,920	56,718	---	73.7	26.3		3.75	3.58		3.71
O	77,971	57,244	---	73.4	26.6		3.75	3.59		3.70
N	79,022	57,770	-	73.1	26.9		3.75	3.59		3.70
D	80,074*	58,296*	---	72.8	27.2		3.75	3.59		3.70
J	80,776	58,734		72.7	27.3		3.75	3.59		3.70
F	81,479	59,173	---	72.6	27.4		3.75	3.59		3.70
M	82,182	59,612	---	72.5	27.5		3.75	3.59		3.70
A	82,884	60,050	---	72.4	27.6		3.75	3.59		3.70
M	83,587	60,489		72.4	27.6		3.75	3.58		3.70
63 J	84,290	60,928	---	72.3	27.7		3.75	3.53		3.70
J	84,993	61,366	---	72.2	27.8		3.75	3.72		3.60
A	85,695	61,805	---	72.1	27.9		3.75	3.92		3.80

APPENDIX TABLE 2B (continued)

DATE		In Billions of Dollars			In Percent						
		TSD[a]	SD[b]	LTD[c]	SD[d]/TSD	STD[e]/TSD	LTD[f]/TSD	MAX[g]/SD	MAX[h]/STD	MAX[j]/LTD	AVG[k]/MAX
	S	86,398	62,244	---	72.0	28.0		3.75	3.92		3.80
63	O	87,101	62,682		72.0	28.0		3.75	3.92		3.80
	N	87,803	63,121	---	71.9	28.1		3.75	3.92		3.80
	D	88,506	63,560	---	71.8	28.2		3.75	3.92		3.80
	J	89,209	63,99[illegible]	---	[illegible]	[illegible]		[illegible]	3.92		3.80
	F	89,912	64,437	---	71.7	28.3		3.75	3.92		3.80
	M	90,614	64,875		71.6	28.4		3.75	3.92		3.80
	A	91,317	65,315		71.5	28.5		3.75	3.92		3.80
	M	92,020	65,753	---	71.4	28.6		3.75	3.92		3.80
64	J	92,722	66,192	---	71.4	28.6		3.75	3.92		3.80
	J	93,425	66,631	---	71.3	28.7		3.75	3.92		3.80
	A	94,128	67,069	---	71.2	28.8		3.75	3.92		3.80
	S	94,831	67,508	---	71.2	28.8		3.75	3.92		3.80
	O	95,533	67,947	---	71.1	28.9		3.75	3.92		3.80
	N	96,236	68,385	---	71.0	29.0		3.75	3.92		3.80
	D	96,939	68,824	---	71.0	29.0		4.00	4.49		4.14
	J	97,642	69,263		70.9	29.1		4.00	4.49		4.14
	F	98,344	69,702	---	70.9	29.1		4.00	4.49		4.14
	M	99,047	70,140		70.8	29.2		4.00	4.49		4.14
	A	99,750	70,579	---	70.8	29.2		4.00	4.49		4.14
	M	100,452	71,018	---	70.7	29.3		4.00	4.49		4.14
	J	101,155	71,456	---	70.6	29.4		4.00	4.49		4.14
65	J	101,858	71,895		70.6	29.4		4.00	4.49		4.14
	A	102,561	72,334		70.5	29.5		4.00	4.49		4.14
	S	103,263	72,773		70.5	29.5		4.00	4.49		4.14
	O	103,966	73,211	---	70.4	29.6		4.00	4.49		4.14
	N	104,669	73,650	---	70.4	29.6		4.00	4.49		4.14
	D	105,372*	74,089*	-	70.3	29.7		4.00	5.50		4.44

APPENDIX TABLE 2B (continued)

	In Billions of Dollars			In Percent						
DATE	TSD[a]	SD[b]	LTD[c]	$\frac{SD}{TSD}$[d]	$\frac{STD}{TSD}$[e]	$\frac{LTD}{TSD}$[f]	$\frac{MAX}{SD}$[g]	$\frac{MAX}{STD}$[h]	$\frac{MAX}{LTD}$[j]	$\frac{AVG}{MAX}$[k]
J	106,860	74,306	---	69.5	30.5		4.00	5.50		4.46
F	108,348*	74,525*	---	68.8	31.2		4.00	5.50		4.47
M	109,211	73,973	---	67.7	32.3		4.00	5.50		4.40
A	110,070	73,422		66.7	33.3		4.00	5.50		4.50
M	110,444*	72,871*	16,750*	65.7	19.2	15.1	4.00	5.50	5.50	4.51
66 J	111,607	72,600	16,070	65.0	19.9	15.1	4.00	5.50	5.50	4.52
J	112,430	72,328	16,991	64.3	20.6	15.1	4.00	5.24	5.50	4.48
A	113,173	72,057	17,095	63.7	21.2	15.1	4.00	5.24	5.50	4.49
S	113,917	71,786	17,208	63.0	21.9	15.1	4.00	4.99	5.50	4.44
O	114,660	71,514	17,320	62.4	22.5	15.1	4.00	4.99	5.50	4.45
N	115,403	71,243	17,433	61.7	23.2	15.1	4.00	4.99	5.50	4.46
D	116,146	70,972	17,545	61.1	23.8	15.1	4.00	4.99	5.50	4.46
J	116,990*	70,7[illegible]*	17,658*	60.5	24.4	15.1	4.00	4.99	5.50	4.47
F	118,201	71,030	17,654	60.1	25.0	14.9	4.00	4.99	5.50	4.47
M	119,512	71,300	17,650	59.6	25.6	14.8	4.00	4.99	5.50	4.48
A	120,924*	71,600*	17,641*	59.2	26.2	14.6	4.00	4.99	5.50	4.48
M	122,602	72,106	18,047	58.8	26.5	14.7	4.00	4.99	5.50	4.49
67 J	124,381	72,612	18,448	58.4	26.0	14.8	4.00	4.99	5.50	4.49
J	126,160*	73,119*	18,850*	58.0	27.1	14.9	4.00	4.99	5.50	4.49
A	127,302	73,482	19,027	57.7	27.6	14.9	4.00	4.99	5.50	4.50
S	128,444	73,846	19,204	57.5	27.5	15.0	4.00	4.99	5.50	4.50
O	129,586*	74,[illegible]*	19,382*	57.3	27.7	15.0	4.00	4.99	5.50	4.50
N			---	56.9	28.8	14.3	4.00	4.99	5.50	4.50
D				56.[illegible]	29.9	13.5	4.00	4.99	5.50	4.50
J	165,592*	92,993*	21,299*	55.2	31.[illegible]	12.9	4.00	4.[illegible]9	5.50	4.50
F	167,084	93,020	22,430	55.7	31.5	12.8	4.00	4.79	5.50	4.50
68 M	168,576	93,062	21,579	55.2	32.0	12.8	4.[illegible]0	4.99	5.50	4.51
A	170,068	9[illegible],097	21,700	54.7	32.5	12.[illegible]	4.50	4.99	6.16	4.87

APPENDIX TABLE 2B (continued)

In Billions of Dollars

DATE	TSD^a	SD^b								
M	171,560	93,131	21,250	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
J	171,034*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
68 J	174,907	93,363	22,375	53.[illegible]	[illegible]	[illegible]	[illegible]	4.59	6.[illegible]	[illegible]
A	176,760	93,559	23,626	52.9	[illegible]	[illegible]	4.5[illegible]	4.[illegible]	6.[illegible]	4.89
S	178,613*	93,756*	24,445*	52.5	33.6	1[illegible].7	4.53	4.99	6.16	4.89
O	179,016	93,715	24,180	52.4	[illegible]	[illegible].5	4.57	4.99	6.16	4.89
N	179,419	93,6[illegible]4	23,9[illegible]	52.2	34.5	13.[illegible]	4.50	4.99	6.[illegible]	4.89
D	179,822	9[illegible],63[illegible]	23,652	52.1	34.7	[illegible]	4.53	4.5[illegible]	6.16	[illegible]
J	180,2[illegible]6*	93,59[illegible]*	24,388*	51.9	35.1	13.0	4.[illegible]	4.99	6.16	4.84
F	180,417	93,467	24,653	[illegible].8	35.5	12.6	4.50	4.99	6.16	4.89
M	180,609	93,741	2[illegible],9[illegible]9	[illegible].7	36.2	12.1	4.50	4.99	6.16	4.88
A	180,801*	93,2[illegible]5*	2[illegible],185*	5[illegible].6	36.7	11.7	4.50	4.99	6.16	4.87
M	179,973	92,075	19,704	51.6	37.4	10.9	4.50	4.93	6.16	4.86
69 J	179,145	92,455	18,218	51.6	38.2	10.2	4.50	4.99	6.16	4.86
J	178,318*	92,075*	16,735*	5[illegible]	39.0	9.4	4.50	4.99	6.16	4.85
A	177,373	91,89[illegible]	15,605	5[illegible].0	39.3	8.9	4.50	4.99	6.16	4.84
S	176,421	91,711	14,875	52.0	39.6	8.4	4.50	4.93	6.16	4.83
O	175,485*	91,529*	13,945*	52.2	39.9	7.9	4.50	4.99	6.16	4.83
N	174,791	90,985	13,241	52.[illegible]	40.0	7.6	4.50	4.99	6.16	4.82
D	174,079	90,441	12,538	52.0	40.8	7.2	4.50	4.99	6.16	4.82
J	173,304*	89,8[illegible]*	11,835*	51.8	41.4	6.8	4.50	5.09	6.99	4.91
F	174,797	90,10[illegible]	12,856	51.5	41.1	7.4	4.50	5.19	6.99	4.97
70 M	176,191	90,306	13,878	51.2	40.9	7.9	4.50	5.19	6.99	4.98
A	177,585*	90,511*	14,900*	51.0	40.6	8.4	4.50	5.19	6.99	4.99
M	180,971	91,092	16,744	50.7	40.5	9.2	4.50	5.19	6.99	5.01
J	184,357	91,654	18,588	49.7	40.2	10.1	4.50	5.19	6.99	5.03
J	187,743*	92,226*	20,432*	49.[illegible]	40.0	10.7	4.50	5.[illegible]9	6.99	5.05

Source See notes

APPENDIX TABLE 2B (continued)

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[a] Total member bank time and savings deposits through October 1967; total insured bank time and savings deposits thereafter taken from [illegible] articles from 1960 through 1971 published in the [illegible]

[b] [illegible] bank savings deposits [illegible] published in the Federal Reserve Bulletin

[c] [illegible] banks [illegible]

[d] [illegible] data

[e] [illegible] time deposits [illegible]

[f] [illegible] 1961 data

[g] [illegible]

[h] [illegible] member banks [illegible]

[i] The [illegible] member banks taken from [illegible] lack of data on small versus large denomination time deposits [illegible] 1966 we have only an effective Regulation Q [illegible] time deposits [illegible] April 1966

APPENDIX TABLE 2B (continued)

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[k] The weighted average Regulation Q ceiling rate equal to the percentage of savings deposits to all time and savings deposits (column four) times the effective Q ceiling on savings deposits (column seven), plus the percentage of small time deposits to all time and savings deposits (column five) times the effective Q ceiling on small time deposits (column eight) plus the percentage of large time deposits to all time and savings deposits (column six) times the effective Q ceiling on large denomination time deposits (column nine).

[l] Figures from Cagle's articles in Federal Reserve Bulletin, even interpolations in between.

APPENDIX TABLE 3. NET FINANCIAL ASSETS HELD BY HOUSEHOLDS, BUSINESS, MUNICIPAL GOVERNMENT, AND FOREIGN SECTORS, 1961 1970 (in billions of dollars)

[illegible]		C	B	G	F	SUM	TOTAL
	J	2.96	1.37	.50	.15	4.98	1388.2
	J	3.16	.73	.10	.25	4.24	1392.4
1961	A	3.16	.73	.10	.25	4.24	1396.7
	S	3.16	.73	.10	.25	4.24	1400.9
	O	3.03	1.48	.48	.36	5.35	1406 3
	N	3.03	1.48	.48	.36	5.35	1411.6
	D	3.03	1.48	.48	.36	5.35	1417 0
	J	3.83	.68	.37	.24	5.12	1422.1
	F	3.83	.68	.37	.24	5.12	1427.2
	M	3.83	.68	.37	.24	5.12	1432.3
	A	3.40	.86	.50	30	5 06	1437.4
	M	3.40	.86	.50	30	5.06	1442.4
1962	J	3.40	.86	.50	.30	5.06	1447.5
	J	3.46	1.33	.41	.05	5.25	1452.8
	A	3.46	1.33	.41	.05	5.25	1458.0
	S	3.46	1.33	.41	.05	5.25	1463.3
	O	3.56	.73	.32	.32	4.93	1468.2
	N	3.56	.73	.32	.32	4.93	1473.1
	D	3.56	.73	.32	.32	4.93	1478.05
	J	3.41	1.51	.55	.45	5.92	1484.0
	F	3.41	1.51	.55	.45	5.92	1489 9
	M	3.41	1.51	.55	.45	5.92	1495.8
	A	3.99	1.78	.65	.55	6.97	1502.8
	M	3.99	1.78	.65	.55	6.97	1509.8
1963	J	3.99	1.78	.65	.55	6.97	1516.7
	J	3.92	1.48	.68	.08	6.16	1522.9
	A	3.92	1.48	.68	.08	6.16	1529.0
	S	3.92	1.48	.68	.08	6.16	1535.2
	O	3.84	.92	1.04	.06	5.86	1541.1
	N	3.84	.92	1.04	.06	5.86	1546.9
	D	3.84	.92	1.04	.06	5.86	1552.8
	J	3.73	1.03	.33	.13	5.22	1558.0
	F	3.73	1.03	.33	.13	5.22	1563.2
	M	3.73	1.03	.33	.13	5.22	1568.4
	A	4.03	1.43	.51	.18	6.15	1574.6
	M	4.03	1.43	.51	.18	6.15	1580.7
1964	J	4.03	1.43	.51	.18	6.15	1586.9
	J	3.68	1.83	.69	.19	6.39	1593.3
	A	3.68	1.83	.69	.19	6.39	1599.7
	S	3.68	.90	.69	.19	6.39	1606.1
	O	4.38	.90	.66	.63	6.57	1612.6
	N	4.38	.90	.66	.63	6.57	1619.2
	D	4.38	.90	.66	.63	6.57	1625.8

APPENDIX TABLE 3 (continued)

DATE		C	B	G	F	SUM	TOTAL
	J	3.33	2.75	.65	.31	7.04	1632.8
	F	3.33	2.75	.65	.31	7.04	1639.8
	M	3.33	2.75	.65	.31	7.04	1646.9
	A	3.99	1.82	.86	.15	6.82	1653.7
	M	3.99	1.82	.86	.15	6.82	1660.5
1965	J	3.99	1.82	.86	.15	6.82	1667.4
	J	4.26	1.88	.69	.10	6.93	1674.3
	A	4.26	1.88	.69	.10	6.93	1681.2
	S	4.26	1.88	.69	.10	6.93	1688.1
	O	4.36	2.33	.78	.10	7.57	1695.7
	N	4.36	2.33	.78	.10	7.57	1703.3
	D	4.36	2.33	.78	.10	7.57	1710.8
	J	3.49	2.28	.78	.12	6.67	1717.5
	F	3.49	2.28	.78	.12	6.67	1734.1
	M	3.49	2.28	.78	.12	6.67	1730.8
	A	3.66	2.50	.93	.52	7.61	1738.4
	M	3.66	2.50	.93	.52	7.61	1746.0
1966	J	3.66	2.50	.93	.52	7.61	1753.6
	J	3.31	1.25	.78	.20	5.54	1759.2
	A	3.31	1.25	.78	.20	5.54	1764.7
	S	3.31	1.25	.78	.20	5.54	1770.3
	O	3.59	.63	.73	.39	5.34	1775.6
	N	3.59	.63	.73	.39	5.34	1780.9
	D	3.59	.63	.73	.39	5.34	1786.3
	J	3.93	1.18	1.01	.23	6.35	1792.6
	F	3.93	1.18	1.01	.23	6.35	1799.0
	M	3.93	1.18	1.01	.23	6.35	1805.3
	A	3.92	.55	.91	.70	6.08	1811.4
	M	3.92	.55	.91	.70	6.08	1817.5
1967	J	3.92	.55	.91	.70	6.08	1823.6
	J	4.72	1.91	.65	.66	7.94	1831.5
	A	4.72	1.91	.65	.66	7.94	1839.4
	S	4.72	1.91	.65	.66	7.94	1847.4
	O	6.14	2.26	.69	1.18	10.27	1857.7
	N	6.14	2.26	.69	1.18	10.27	1867.9
	D	6.14	2.26	.69	1.18	10.27	1878.2
	J	4.33	2.78	.48	.73	8.32	1886.5
	F	4.33	2.78	.48	.73	8.32	1894.8
	M	4.33	2.78	.48	.73	8.32	1903.2
	A	4.94	1.53	.44	.58	7.49	1910.6
	M	4.94	1.53	.44	.58	7.49	1918.1
1968	J	4.94	1.53	.44	.58	7.49	1925.6
	J	4.61	2.56	.92	.58	8.67	1934.3
	A	4.61	2.56	.92	.58	8.67	1943.0
	S	4.61	2.56	.92	.58	8.67	1951.6
	O	6.09	1.83	1.10	.87	9.89	1961.5
	N	6.09	1.83	1.10	.87	9.89	1971.4
	D	6.09	1.83	1.10	.87	9.89	1981.3

APPENDIX TABLE 3 (continued)

DATE		C	B	G	F	SUM	TOTAL
1969	J	4.71	3.38	.90	1.16	10.15	1991.5
	F	4.71	3.38	.90	1.16	10.15	2001.6
	M	4.71	3.38	.90	1.16	10.15	2011.8
	A	4.18	2.22	.60	1.27	8.27	2020.0
	M	4.18	2.22	.60	1.27	8.27	2028.3
	J	4.18	2.22	.60	1.27	8.27	2036.6
	J	4.72	2.38	.46	1.03	8.59	2045.2
	A	4.72	2.38	.46	1.03	8.59	2053.8
	S	4.72	2.38	.46	1.03	8.59	2062.3
	O	4.83	1.88	.50	-.02	7.19	2069.5
	N	4.83	1.88	.50	-.02	7.19	2076.7
	D	4.83	1.88	.50	-.02	7.19	2083.9
1970	J	4.48	3.08	.66	.73	8.95	2092.9
	F	4.48	3.08	.66	.73	8.95	2101.8
	M	4.98	3.08	.66	.73	8.95	2110.8
	A	5.98	2.09	1.22	.40	9.69	2120.4
	M	5.98	2.09	1.22	.40	9.69	2130.1
	J	5.98	2.09	1.22	.40	9.69	2139.8

C: Households, personal trusts, nonprofit corporations
B: Nonfinancial business.
G: State and local government
F: Rest of the world
SUM: Sum of C, B, G, and F for each month.

Source: Changes in holdings of financial assets for each sector taken from quarterly figures in "Flows of Funds," various issues of the Federal Reserve Bulletin, each quarter's change being divided evenly among the three months included in the quarter The total figures for each month are simply the total from the previous month plus the net change, given in column A, for the current month. The financial assets of the Federal Government were excluded since they hold no commercial bank time or savings deposits.

APPENDIX TABLE 4: INTEREST RATES PAID ON SAVINGS AND LOAN ASSOCIATION SHARES, 1960-1970
(in percent)

DATE	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
January	--	3.88	4.00	4.13	4.15	4.21	4.36	4.58	4.68	4.75	4.97
February	--	3.88	4.02	4.14	4.18	4.22	4.38	4.60	4.68	4.76	4.99
March	--	3.89	4.03	4.15	4.19	4.22	4.39	4.61	4.68	4.77	5.02
April	--	3.89	4.05	4.15	4.19	4.23	4.41	4.63	4.68	4.78	5.04
May	--	3.89	4.06	4.15	4.19	4.23	4.43	4.65	4.68	4.79	5.06
June	3.86	3.90	4.08	4.17	4.19	4.23	4.45	4.67	4.68	4.80	5.09
July	3.86	3.91	4.09	4.17	4.19	4.25	4.47	4.67	4.69	4.82	--
August	3.86	3.93	4.10	4.17	4.20	4.27	4.49	4.67	4.70	4.85	--
September	3.87	3.94	4.10	4.17	4.20	4.29	4.51	4.67	4.71	4.87	--
October	3.87	3.96	4.11	4.17	4.20	4.30	4.52	4.67	4.72	4.89	--
November	3.87	3.97	4.12	4.18	4.21	4.32	4.54	4.67	4.73	4.92	--
December	3.88	3.99	4.12	4.19	4.21	4.34	4.56	4.68	4.74	4.95	--

Source: The June figures are the yearly averages of interest rates paid on all insured savings and loan association shares, see U.S. Savings and Loan League, Fact Book 1971, p. 17. The interest rates from July of one year to May of the next are even interpolations of the difference between the average interest rate paid for one year and the next.

APPENDIX TABLE 5: INTEREST RATES PAID ON MUTUAL SAVINGS BANK DEPOSITS, 1960-1970
(in percent)

DATE	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
January	--	3.51	3.73	3.92	4.02	4.09	4.31	4.62	4.75	4.81	4.95
February	--	3.52	3.75	3.93	4.02	4.09	4.33	4.65	4.75	4.82	4.97
March	--	3.53	3.77	3.94	4.03	4.10	4.36	4.67	4.75	4.83	4.98
April	--	3.53	3.80	3.95	4.03	4.10	4.39	4.69	4.75	4.83	5.00
May	--	3.54	3.82	3.95	4.05	4.11	4.42	4.72	4.75	4.84	5.01
June	3.47	3.55	3.85	3.96	4.06	4.11	4.45	4.74	4.76	4.85	5.03
July	3.47	3.57	3.86	3.97	4.06	4.14	4.47	4.74	4.77	4.86	--
August	3.48	3.60	3.87	3.98	4.07	4.17	4.50	4.74	4.78	4.88	--
September	3.49	3.62	3.88	3.98	4.07	4.20	4.52	4.74	4.78	4.89	--
October	3.49	3.65	3.89	3.99	4.08	4.23	4.55	4.74	4.79	4.91	--
November	3.50	3.67	3.90	4.00	4.08	4.25	4.57	4.75	4.80	4.92	--
December	3.51	3.70	3.91	4.01	4.08	4.28	4.60	4.57	4.80	4.94	--

Source: The June figures are the yearly averages of interest rates paid on mutual savings bank deposits, see U.S. Savings and Loan League, Fact Book, 1971, p. 17. The interest rates from July of one year to May of the next are even interpolations of the difference between the average interest rate paid for one year and the next.

BIOGRAPHICAL SKETCH

Marguerite H. VanLandingham was born in Evanston, Illinois, on January 17, 1945. She attended school in Park Ridge, Illinois, and in Key West and Miami, Florida, graduating from Miami Palmetto High School in June, 1963.

In September, 1963, she entered the University of Florida, pursued an undergraduate degree in economics, and graduates with a Bachelor of Arts degree in August, 1968. While at Florida, she met and married her husband, H. Wade VanLandingham.

From 1968-1972, Mrs. VanLandingham pursued graduate work in finance at the University of Florida aided by the generous award of an NDEA Title IV Fellowship. She graduated with a Ph.D. in economics and business administration in December, 1972.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

C A Matthews

C. A. Matthews, Chairman
Professor of Finance and Insurance

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Ralph H. Blodgett

Ralph A. Blodgett
Professor of Economics

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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Professor of Industrial Relations and Management

This dissertation was submitted to the Department of Finance and Insurance and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

December, 1972

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